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Theme of the Conference

Materials Science and Mechanical & Systems Engineering

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It is our great pleasure to welcome you to the 4th International Congress on Advances in Mechanical and Systems Engineering (CAMSE2023) in a online mode which is supported by STEM Research Society and Dr. B. R. Ambedkar National Institute of Technology Jalandhar. CAMSE is appropriately conceived to offer a forum to bring all applied researchers together under one umbrella. CAMSE is now four old conference; which means more diligent handling and sense of responsibility is required for the continuous improvement and growth. In addition, CAMSE2023 is very fortunate to have so many top quality panel, keynote speakers. We sincerely thank them all. We are particularly looking forward to the invited talks. We are delighted to have such a strong and varied series of plenary talks at the conference. There are two further key features of this conference series that make this a unique event - i.e. these events are "go-green" environmentally friendly conferences where emphasis is on the quality of academic endeavour rather than spin and gloss; and these events see participation from large number of young researchers and particularly women scientists which is an important aspect if we are to increase female participation in STEM (Science, Technology, Engineering, and Mathematics) areas. Conferences like these are only possible thanks to the hard work of a great many people and the successful organization of CAMSE2023 has required the talents, dedication and time of many volunteers and strong support from sponsors. Chairs of each event contributed exceptionally by attracting contributions, getting them reviewed, making accept and reject recommendations, developing the programs and so on. We also thank the National and International advisory committee. Publication of CAMSE2023 proceedings is not a simple task. Committee has contributed immensely. We are as ever grateful to the AIP Conference Proceedings which is indexed in Scopus, CPCI – Web of Science (Thomson Reuters), Inspec, for their dedication and professionalism in helping us produce what is an excellent and high-quality proceeding. Also we would like to appreciate and thanks to all our colleagues on the Organizing Committee for their sincere work and support throughout the year. It only remains for us to thank all of you for participating in the conference and helping to make it a success. We hope that all of you will benefit from the extensive technical program (in online mode) and establish long lasting interactions with fellow delegates at CAMSE2023.

Dr. Tarun K. Sharma
Dr. Om Prakash Verma

The STEM-Research Society, a foundation is registered in the year 2020 to support and promote the research in the multidisciplinary domain under the able guidance of renowned academicians and researchers from India and abroad. The objective of the foundation is Scientific, Technical, Research and Educational in nature. The foundation strives to advance the theory, practice, and application of Science, Technology, and Engineering & Management and maintains a high professional standing among its members. The basic purpose of the STEM-RS is to bring together Researchers, Academicians, Industrialists and Experts from different parts of the country and abroad to exchange the knowledge and ideas at a common platform by organizing National and International events such as Conferences, Seminars and Workshops that unite the Science, Technology, Engineering and Management and topics which are not mentioned here for the empowerment of research and development.

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Diversity Statement

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CAMSE is now four year old International Conference. CAMSE is a STEM Research Society conference series. The conference's theme is slightly modified this year and more inclined towards Materials Science and Mechanical & Systems Engineering.

CAMSE2022: organized in Hybrid Mode at Shobhit Deemed University, Meerut in supported by CSIR, Govt. Of India and technically supported by Dr. B. R. Ambedkar National Institute of Technology Jalandhar and STEM - Research Society, India

CAMSE2021: organized in Virtual Mode at Dr. B. R. Ambedkar National Institute of Technology Jalandhar in support with STEM - Research Society, India

CAMSE2020: organized in Virtual Mode in association with Shobhit University Gangoh, Saharanpur in support with STEM - Research Society, India

The Congress on Advances in Mechanical and Systems Engineering (CAMSE) aims to proclaim knowledge and share the growing demands for increasing several design and development activities. CAMSE 2023 (www.camse.in) is a blend of mechanical engineering, materials science, computer-aided engineering, control engineering, systems design engineering and electronic engineering to design and manufacture useful industrial or engineering materials. CAMSE will focus on the latest novel advances regarding the development, implementation, and use to combine the design, mechanics, machines, materials science and technology, thermo-fluids, and control with state-of-the-art computational methods to analyse, innovate, design, implement and operate complex systems which are economical, reliable, efficient and sustainable.

The conference's theme is slightly modified this year and more inclined towards Materials Science and Mechanical & Systems Engineering.

The objective of CAMSE2023 is to provide a common platform to researchers, academicians, scientists and industrialists working in the area of Materials Science and Mechanical & Systems Engineering to share and exchange their views and ideas on the theory and application of the same in multi-disciplinary areas.

CAMSE Series is an event of Science, Technology, Engineering and Management (STEM) – Research Society (http://stemrs.in/). The proceedings of CAMSE2020 and CAMSE2021 are published in Lecture Notes in Mechanical Engineering (LNME), Indexed in SCOPUS. This year proceedings will be published in **AIP Conference Proceedings which is indexed in Scopus, CPCI – Web of Science (Thomson Reuters), Inspec**. The credit of the success of the CAMSE goes to our Mentors, Speakers, Guests, Members of the advisory board (National & International), Program Committee members, all the Author(s), participants and the reviewer's board. We sincerely appreciate your continued support, encouragement and trust in us. We look forward to have this wonderful support in the coming CAMSE Series as well.

Name of the Authors included in the Manuscript	Affiliation of all the Authors included in the Manuscript
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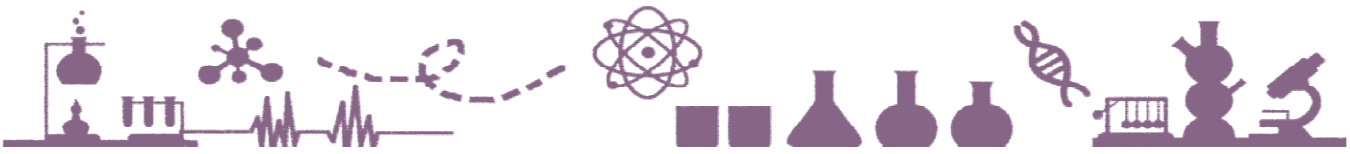

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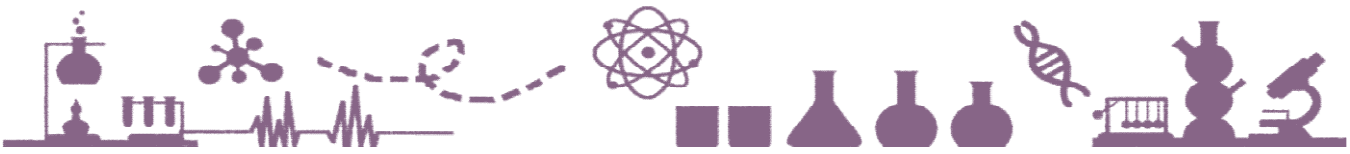

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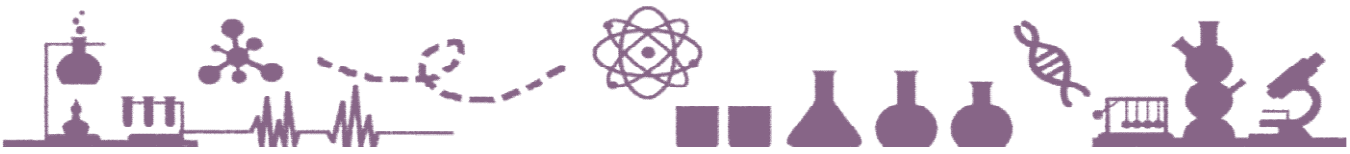

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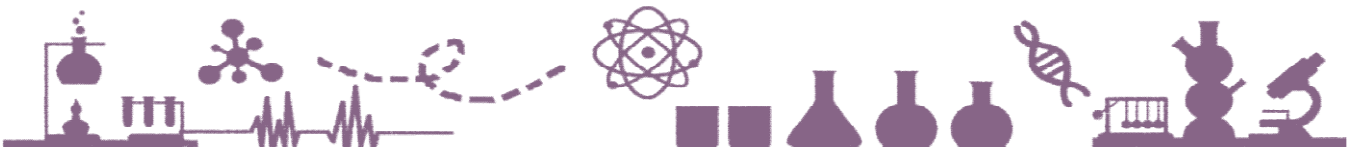

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Linear Translation Motion Of A Stewart Platform With Solid Works Modelling And Matlab Simulation	Sibsankar Dasmahapatra (Kalyani Government Engineering College)*; Souvit Mondal (Kalyani Government Engineering College); Mintu Ghosh (Bengal College Of Engineering And Technology)
Linear Motion Of Low Cost Electric Actuator With PID Controller	Sibsankar Dasmahapatra (Kalyani Government Engineering College)*; Mintu Ghosh (Bengal College Of Engineering And Technology); Aritra Karar (Kalyani Government Engineering College); Pratyush Jyoti Roy (Kalyani Government Engineering College)
Performance Enhancement Of An Evacuated Tube Solar Air Heater Using Different Design Of Inserts	Sushil Kumar (Hansraj College)*; Satish Chand (Hansraj College); Meena Kumari (Hindu College)
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Optimization Of Micro-ECDM Parameters For Optimum Micro-Channelling Performances On Glass By Using Taguchi Technique	Dr Bijan Mallick (GIMT)*
Performance Of Steel Structure On Various Earthquake Zones"	Palash Prakash Pawar (G.H.Raisoni College Nagpur)*
Designing Of Shredder Machine For Recycling Post Consumer Denim Waste	Vivek Ramesh Sharma (Government College Of Engineering, Chandrapur)*
Thrust Analysis Of Multi Catalytic Solid Propellant	Malkapuram Devaiah (Geethanjali College Of Engineering And Technology)*; Dr. Malakapuram DEVAIAH (Geethanjali College Of Engineering And Technology)
Rural Electrification Through Techno-Economic Analysis Of Hybrid Renewable Energy System: A Case Study Of North-East, India	Nagendra Kumar (National Institute Of Technology Durgapur)*
Simulation Of A Mechanical System Using A Game Development Engine	Thanikaivelan A (Dr Mahalingam College Of Engineering And Technology)*; Sarvesh B (Dr Mahalingam College Of Engineering And Technology)
Revolutionizing Taste: Exploring Nanotechnology's Impact On The Food And Beverage Market	Sivarethinamohan R (Symbiosis Centre For Management Studies, Bengaluru)*

Modelling And Fault Diagnosis Of Spur Gear With Increasing Level Of Faults	Chintamani Mishra (NIT Durgapur)*
A Comparative Study On Column Supported Shear Wall Buildings	PRITAM HAIT (CVR College Of Engineering Technology)*; B. Ashok Reddy (CVR College Of Engineering)
Seismic Analysis Of Multi-Storeyed Building Considering Planner Irregularities	Pritam Hait (CVR College Of Engineering Technology)*; Deepika Karna (CVR College Of Engineering)
Effects Of Process Parameters Of Plasma Arc Cutting On Stainless Steel And Structural Steel	Mehmet ERBİLEN (Yildiz Technical University)*; ORHAN ÇAKIR (YILDIZ TECHNICAL UNIVERSITY)
Parametric Optimization Of Orthopaedic Bone Drilling To Achieve Minimum Heat Generation	Pinaky Bhadury (Siliguri Institute Of Technology)*; Srija Sarkar (Jalpaiguri Government Engineering College); Soumil Banik (Jalpaiguri Government Engineering College); Ankur Paul (Jalpaiguri Government Engineering College); Sumitava Paul (Jalpaiguri Government Engineering College); Nripen Mondal (Jalpaiguri Government Engineering College)
A Review-Recent Development In The Field Of Desiccant Based Air Conditioning	Sonendra Sharma (Delhi Technological University(DTU)And KIET Group Of Institutions, Ghaziabad)*; Dr. Raj Kumar Singh (Delhi Technological University(DTU)); Dr. Manjunath K (Delhi Technological University(DTU))
Influence Of Wishbone Vortex Generator In Flow Separation Delay Of NACA 66(2)-215 Wing Surface	Karthik J (Saveetha School Of Engineering)*; Navin Kumar Balasubrmanian (Saveetha School Of Engineering)

Abstracts

Assessment of Surface Layer Characteristic on Flexible Pavement Design Life

Sinan Ibrahim (Mustansiriya University); Mohammed Jameel (Mustansiriya University); Esraa Jaafar (Mustansiriyah University); Nabil Jassem (Mustansiriya University); Zuhair Hacheem (Mustansiriya University); Ahmed AL-Ridha (Mustansiriya University)*

The surface, a layer directly under tire load, is often made of crushed aggregate, gravel, or recycled materials. In order to extend the operational lifetime of the road, the surface serves as higher properties of materials. The impact of performance for the surface layer on the design life was examined in this research. Employing the KENPAVE software, the study examined the impact of changing the thickness of the surface layer (2″, 2.5″, and 3″) and the resilient modulus (300, 400, and 500 ksi) on the expected service life of the flexible pavement for both repeated loads 30000 and 40000. The results show that the increased surface layer thickness lead to the increase in pavement design life for all resilient modulus and both repeated loads. The percentage of increase of design life of pavement grew as the resilient modulus grew (for all repeted loads). As resilient modulus of surface layer increased, so did the pavement design life increase. The percentage of increasing the design life of pavement results from increased resilient modulus was increased with the increasing thickness layer . the percentage of improvement the design life of pavement caused by increase of resilient modulus, increse with increse the surfase layer thickness (for all repeted loads).

Effect of Plastic Waste on UCS, CBR and Swelling Characteristics of Fly Ash Stabilized Clay Soil

Batchu Ramanajneyulu (Jawaharlal Nehru Technological University Hyderabad)*; Nandyala Dargakumar (JNTUH UCEST); C Lavanya (GRIET Hyderabad)

High swelling clay soils cause a greater financial loss to property owners than earthquakes, floods, hurricanes, and tornadoes combined. These soils are always a challenge for civil and geotechnical engineers. Clay soils with montmorillonite mineral may be significant hazard to engineering constructions such as buildings, roads, canal linings etc., due to their ability to shirk or swell with change in the water content. Though numerous studies are carried out on swelling soils by various researchers, still in the light of utilization of plastic waste, a study is conducted in the laboratory to bring out the effect of plastic waste on Unconfined Compression Stress (UCS), California Bearing Ratio (CBR) and Swelling behavior of fly ash stabilized clay soil. Clay soil used in the present study possesses free swell index of 100%, liquid limit of 62% and % fine fraction (silt & clay) 68. The fly ash proportions used in the study are 0%, 2%, 4%, 6%, 8% and 10%. The plastic waste cut into smaller pieces was added to the fly ash stabilized clay in the proportions of 0%, 0.5% and 1% by dry weight of soil. From the results, it is found that the effect of plastic waste on UCS and CBR is not significant but, the free swell index has reduced from 100% to 20%. Keywords: UCS, CBR, free swell index, plastic waste, clay.

The production of structural concrete and the effects of various waste materials on concrete using as partial replacements of cement

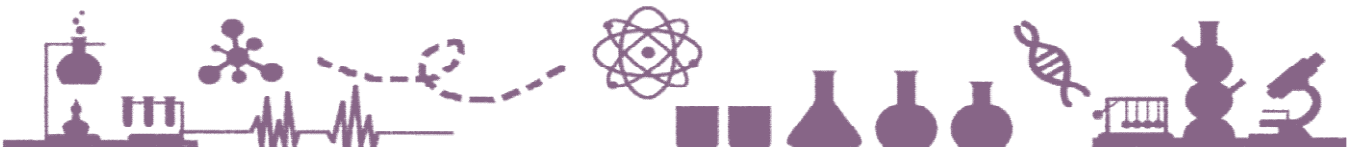
Samreen Bano (Integral University, lucknow)*

Supplementary Cementitious Materials (SCMs) are additives incorporated into concrete mixtures to enhance their properties and minimize their environmental impact. Common SCMs include fly ash, slag, silica fume, red mud, construction and demolition waste (C&D), and mortar waste. The addition of SCMs in construction practices offers the advantage of reducing the amount of Portland cement needed in concrete production, which is a significant contributor to carbon dioxide emissions, thereby lowering greenhouse gas emissions. Furthermore, the inclusion of SCMs can improve the durability and performance of concrete, making it a more sustainable option for construction projects. Consequently, the construction industry is actively researching and developing novel materials to enhance the sustainability of concrete further. Various alternatives exist for cement substitution, aiming to enhance the overall quality of concrete without compromising its strength. This research study focused on assessing the effects of substituting cement with mortar, red mud, and eggshells in the M25-grade of a concrete mixture. The evaluation involved measuring the compressive, flexural, split tensile, and flexural strength at curing periods of 7, 14, and 28 days. The findings revealed that using these waste materials resulted in superior structural properties of concrete compared to traditional concrete compositions. Additionally, the micro-structural characteristics of different waste materials were investigated through Scanning Electron Microscopy (SEM), Energy-Dispersive X-ray Spectroscopy (EDX), and Fourier Transform Infrared Spectroscopy (FTIR) tests

Use of Recycled Concrete Aggregate (RCA) waste as an Alternative source in the construction

Samreen Bano (Integral University, lucknow)*

Natural aggregate is the primary source of aggregate used in concrete projects worldwide. A significant portion of solid waste produced worldwide consists of construction and demolition waste, much of which ends up being



deposited in landfills. Concrete is used to make hollow building blocks, solid soil-cement blocks, recycled brick and plastic concrete, and concrete made from organic materials like rice husks and recycled plastic. RCAs are a mixture of aged concrete aggregates, bricks, gypsums, glass, ceramics, and other materials, with the main component being aged concrete aggregates. The construction and demolition (C&D) waste collected by municipal solid waste is a combination of bricks. Steel, weir, mortar and coarse aggregate. After separating the coarse aggregate from C&D waste, further analysis of its physical and chemical properties with the help of scanning electron microscopy. Design for mix trial of M20 grade used in different proportions of recycled aggregate such as 30%, 50%, 80%, and 100%. The end product obtained under this project is BRICK. Recycled coarse aggregates from construction and demolition waste (CDW) may be used effectively to produce concrete with equivalent compressive strength and durability to concrete made with natural coarse aggregates (NCA). Recycled aggregate reduces the environmental impact of waste. Scanning electron microscopy (SEM) is used to abstract the microstructure of concrete cube crumbs.

Studies and comparison of red mud and neutralised red mud using waste lemon biomass juice for composite reinforcement application.

PRIYESHIV KUMAR GURMAITA (NIT NAGALAND)*; Rosang Pongen (NIT NAGALAND); SHIVAL GURMAITA (GEC BANKA)

Red mud is a waste product of the alumina industry that causes significant environmental and health problems. Red mud's powerful alkalinity has a significant impact on both its potential for use in composite reinforcement and its wide range of other applications. For the neutralisation of red mud, method using natural waste lemon biomass and no chemical addition was suggested. Lemon juice was used to neutralise red muck, and the stirring process was studied. GC-MS can detect the presence of organic acids in lemon juice. Under experimental conditions, red mud's alkalinity can be effectively lowered by adding lemon juice, which also lowers the material's pH from 10.4 to 7.56. Numerous characterisations, including XRD, FTIR and TGA, were used to investigate the neutralisation mechanism. Red mud doesn't alter much after neutralisation; hence it is concluded that small-molecule organic acids just remove free alkali without changing the chemical composition. In order to improve corrosion resistance, neutralised red mud was employed as a reinforcement in metal matrix composites.

Rapid and reliable QuEChERS-based method for simultaneous quantification of Sertraline, Trazodone and Fluoxetine Hydrochloride from simulated urine using LC-MS/MS

Palak Sharma (Amity University,Noida); Chintan Singh (Amity University, Noida); Lav Kesharwani (Sam Higginbottom University of Agriculture Technology And Sciences ,Prayagraj); Prateek Pandya (Amity University Uttar Pradesh); Jyoti Singh (Amity University)*

Antidepressants (ADs) are one of the most prescribed medications that are commonly used to treat depression and anxiety. Sertraline (STH), Fluoxetine (FLX), and Trazodone Hydrochloride (TRZ) which belong to the selective serotonin reuptake (SSRIs) and selective antagonist reuptake inhibitors (SARIs) families are clinically used for the treatment of depression. With the advent of analytical techniques, several methods have been developed for the extraction of (ADs) from complex biological matrices. However, these newly discovered methods need to be better evaluated, especially in clinical and forensically relevant matrices. The best strategy for analyzing these (SSRIs and

SARIs) drugs from simulated urine samples using liquid chromatography coupled with tandem mass spectrometry. We have used a modified QuEChERS (Quick, easy, cheap, efficient, robust, and safer) method for the detection and quantitation of STH, FLX, and TRZ in simulated urine samples at six different concentrations (5, 10, 20, 50, 100, and 200 ng mL-1). The method was validated according to the Scientific Working Group of Forensic Toxicology (SWGTOX) guidelines and provided satisfactory recovery ranging from 87.2 to 113.6%. The limit of detection (LOD) ranged from 0.090-0.125 ng mL-1 whereas the Limit of Quantitation (LOQ) was from 0.36 ng mL-1 to 0.381 ng mL-1. The plot of linearity was made, for the developed method which is in the acceptable range of 5 ng mL-1 to 200 ng mL-1. The multiple rate monitoring (MRM) modes were employed to collect the monitoring and quantitative pairs. The number of samples successfully demonstrated the effectiveness of QuEChERS in this field. The proposed method is simple, versatile, requires less sample volume, and can be successfully applied to the simultaneous detection of drugs in simulated urine samples.

Simultaneous Detection of Aminocarb, Formetanate Hydrochloride, and Permethrin from Simulated Urine using QuEChERS and LC-MS/MS

Shweta Singh (Amity University); Palak Sharma (Amity University,Noida); Lav Kesharwani (Sam Higginbottom University of Agriculture Technology); Prateek Pandya (Amity University Uttar Pradesh); Jyoti Singh (Amity University)*

Pesticides offer economic benefits, but their prolonged use has raised concerns about their direct and indirect effects on human health and the environment. Exposure to pesticides has been associated with various health disorders, including cancer, neurodegenerative diseases, and reproductive disorders. In addition, these pesticides are also used as homicidal and suicidal poisons. In this study, a modified QuEChERS technique was employed alongside Liquid Chromatography-Tandem Mass Spectrometry to quantify the concentration of Aminocarb, Formetanate Hydrochloride, and Permethrin in urine samples. The test sample was injected at a fixed volume of 10 µL, and concentrations ranging from 5 to 200 ng/mL were analyzed while maintaining the analytical column temperature at 40°C. The limit of detection and quantification ranged from 0.076 – 0.097 ng/mL and 0.232 – 0.294 ng/mL, respectively, with an extraction yield of >73%. This method's application is advantageous for extracting pesticides from urine samples, as it allows for quantification even at lower concentrations.

Optimization and Validation for the Determination of Ribavirin from Simulated Matrices using Modified QuEChERS – LCMS/MS Method for Forensic Purposes

Priyanka Gopi (Amity University Uttar Pradesh); Chintan Singh (Amity University Uttar Pradesh); R K Sarin (National Forensic Sciences University); Prateek Pandya (Amity University Uttar Pradesh)*

The widespread use of antiviral drugs has escalated due to the prevalence of highly infectious pathogens, posing significant risks to human health. However, this increased consumption has also led to the misuse and abuse of these drugs, resulting in harmful side effects and potential organ damage, even leading to fatalities. An antiviral that has reported various such cases is Ribavirin which is commonly used against Hepatitis virus. In this paper, we conducted a comprehensive study aimed at developing and validating a LCMS/MS method for the forensic

detection and quantification of Ribavirin in simulated biological matrices such as urine, saliva, and gastric lavage. The method utilized a modified QuEChERS approach for efficient sample extraction and met the rigorous validation criteria outlined in the SWGTOX guidelines for bio-analytical methods. The method demonstrated exceptional linearity, precision, and accuracy across a linear range of 2-100 ng/mL. The limit of detection ranged from 6.8 to 12.1 ng/mL, while the limit of quantification ranged from 20.65 to 36.68 ng/mL. The recovery rates achieved ranged from 70% to 120%, with standard deviation values below 20%. The assay exhibited excellent ruggedness, ensuring reliable results across different samples and conditions. Moreover, this method can be expanded to detect other antiviral drugs, broadening its utility in forensic analysis.

Development of Highly Sensitive LC-MS/MS based Method for the Quantitative Determination of Chlorpropham Pesticide from Simulated Biological Matrices

Majji Sai Sudha Rani (Amity university, Uttar Pradesh); Chintan Singh (Amity University, Uttar Pradesh); R K Sarin (National Forensic Sciences University); Prateek Pandya (Amity University Uttar Pradesh)*

Chlorpropham (CPM) is a widely utilized pesticide in agricultural and food production settings. Similar to other pesticides, it possesses the potential to elicit detrimental effects on human health upon exposure. This study aimed to develop a liquid chromatography-tandem mass spectrometry (LC-MS/MS) technique coupled with QuEChERS (Quick, Easy, Cheap, Effective, Rugged, and Safe) method for the extraction and detection of CPM residues in simulated biological matrices, viz., Saliva, Urine, Gastric fluid. The QuEChERS method employed a suitable solvent, acetonitrile, to enhance extraction efficiency by extracting CPM from the sample matrices. Subsequently, a clean-up process was implemented to diminish the matrix effect of the analyte, and the resulting extract was introduced into the LC-MS/MS system. The method was validated based on selectivity, sensitivity, accuracy, precision, and recovery. The results demonstrated high sensitivity of the LC-MS/MS method, as evidenced by a limit of detection (LOD) and a limit of quantitation (LOQ) of 6-9 ng/mL and 12-28 ng/mL, respectively. Moreover, the method exhibited exceptional accuracy and robustness, with recovery values ranging from 70% to 120%. This study provides a reliable and efficient approach for the extraction and detection of CPM residues in biological matrices, thereby facilitating monitoring and control of this pesticide's presence in food and supporting forensic toxicological investigations.

Effect of Marble Dust on UCS and CBR of Gypsum Stabilized Clay

Batchu Ramanajneyulu (Jawaharlal Nehru Technological University Hyderabad)* "

Waste minimization through its utilization in various engineering constructions is the thought of every field engineer. Stabilization of clay soil using lime and fly ash has been in practice since good olden days. Marble dust is one amongst the waste is being generated huge quantities in the recent past. Improved living standards and infrastructure development caused use of polished marbles and in the process huge marble waste is getting generated. In this study, the marble dust along with gypsum is admixed to the clay soil, in order to understand the geotechnical characteristics such as Atterberg limits, optimum moisture content (OMC), maximum dry density (MDD), unconfined compression stress (UCS) and California bearing ratio (CBR). Also on the soil and admixed soil samples the XRD and SEM analysis is carried out to identify the mineralogical composition present in them. The results showed that with the addition of marble dust to the 6% gypsum stabilized clay; there is a reduction in the liquid limit and plasticity index of the mixes. Also, there is an improvement in CBR and UCS of mixes, especially at 15% marble dust. Further, the clay soil stabilized with 6% gypsum and admixed with 15% marble dust showed good

improvement in UCS when it is cured for 14 days and 28 days. Overall, the marble dust of 15% can be added to the clay soil which is stabilized at 6% gypsum to have improved performance in terms of UCS and CBR.

The influence of layout configuration on geosynthetic reinforced soil bed- An experimental study

Tanmoy Shil (NIT Agartala)*

The use of reinforcement has been shown to have positive benefits on load-settlement characteristics of low-quality soil. Within the domain of planner reinforcements, geocomposite (GC) and geotextile (GT) are a class of technical textile materials that have arched a niche in this evolving technology. This paper presents the experimental study on the behaviour of model square footing resting on a sandy soil bed reinforced with a variety of planar reinforcements under monotonic loading. Different series of laboratory model tests were performed on homogeneous foundation system. The test results demonstrated the potential benefit of using geosynthetic-reinforced sand foundations which primarily depends upon the configuration of the mattresses. The inclusion of reinforcement can redistribute the applied footing load to a more uniform pattern, hence reducing the stress concentration, which will result in reduced settlement. The parameters premeditated in this experimental investigation include the effects of the top layer location of reinforcement, size of reinforcement layers and number of reinforcement layers. An increasing trend of improvement has been found irrespective of the type of planner reinforcement. The improvement was expressed in terms of the bearing capacity ratio (BCR) and settlement reduction ratio (SRR). However, higher improvement was exhibited using geocomposite (GC) reinforcement compare to geotextile (GT). The test results revealed that the reinforcement layout or configuration has a high potential to increase the overall performance of reinforced fill.

A Review on Tribological Response of advanced Ceramic Coatings

Chakresh yashwant shende (government engg chandrapur)*; Pranay Bagde (Government College of Engg Chandrapur); Sanjay Sapate (VNIT Nagpur)

Plasma sprayed Ceramics coatings are widely used as surface protective materials in numerous industrial applications due to the excellent properties, such as high hardness, high fatigue strength and outstanding wear resistance. But maximum degradation rate of this coatings in real application is seen by sliding and abrasive wear. The wear resistance of this coatings depend upon various parameters such as Microstructure,Tribofilm-formation,micro-Hardness,post HeatTreatment,environment and Spraying parameters (powder ratio,size,deposition temperature, spaying distance),load and Sliding Velocity etc. This paper reviews different powder mixtures coatings with and without lubricants by plasma spray ,HVOF method and discuss the effect of the above parameters on wear resistance ,COF and Fracture Toughness, regimes of wear and there degradation mode is also discussed.

Electrical Resistivity Tomography to prove in-crop zone of coal seams

SATYAVEER SINGH (CMPDIL, CIL)*; Annapurna Boruah (UPES Dehradun); J DEVARAJU (UPES, DEHRADUN); VIPIN KUMAR (CMPDIL, CIL)

The resistivity of subsurface varies according to geological characteristic of rock, porosity, saturation of water, mineral and fluid content etc. in the rock. Resistivity imaging survey is more effective tool than other conventional electrical survey as it acquires continuous electrical data with different configurations. Resistivity of subsurface in 2D sections along the survey lines are measured and plotted with help of inversion techniques to depict the actual

lithology of the subsurface in Electrical resistivity imaging survey. Coal seams have a lot uncertainty in its in-crop zone. The Electrical Resistivity Tomography is effectively used to prove the in-crop zone of coal seams. The electrical resistivity imaging survey may be done to prove the existence, fault, depth and as well as thickness of coal seams with higher accuracy without going into costly and tedious drilling activities. Resistivity of coal seams are generally higher than sedimentary country rock. Resistivity variations of subsurface are well correlated with geological formation as provided in borehole lithology.

An analysis of the stir-cast A356/fly ash composite's microstructure and mechanical characteristics.

ABHISHEK KUMAR (NIT Nagaland)*; Rosang Pongen (NIT Nagaland)

This study presents an analysis of the microstructure and mechanical characteristics of a stir-cast A356/fly ash composite. The composite was fabricated using the stir casting method, which involves the incorporation of fly ash particles into the A356 matrix. The microstructure of the composite was examined using scanning electron microscopy (SEM), and the mechanical properties were evaluated through tensile and hardness testing. The results indicate that the addition of fly ash particles led to refined grain structure and improved mechanical properties. The composite exhibited enhanced tensile strength and hardness compared to the A356 matrix. The microstructural analysis revealed a homogeneous distribution of fly ash particles within the A356 matrix.

Surface roughness investigation of AISI 4340 Steel with Coated Carbide Inserts during hard turning

ABHISHEK KUMAR (NIT Nagaland)

Rosang Pongen (NIT Nagaland)

This study focused on investigating how cutting parameters affect surface roughness in the hard turning of AISI 4340 steel using coated carbide inserts. The quality and performance of components produced through hard turning processes are significantly impacted by surface roughness. The cutting parameters examined were cutting speed, feed rate, and depth of cut. The findings revealed that as the cutting speed was increased, surface roughness decreased. Conversely, increasing the feed rate and depth of cut led to an increase in surface roughness. These results can be applied to enhance the quality and performance of components manufactured through hard turning processes by optimizing the cutting parameters to achieve the desired surface roughness for AISI 4340 steel.

Material and Structural Aspect of Current Collector Plates for Direct Methanol Fuel Cell

SEEMA Sudhakar Munjewar (GP Bramhapuri)*

The most notable electrochemical device for the continuous conversion of chemical energy into electrical energy as long as fuel is available is the fuel cell.Recently, direct liquid fuel cells (DLFCs) have garnered a lot of interest. Direct methanol fuel cells(DMFCs) are viewed in all DLFCs as a dependable alternative to Li-ion batteries in mobile applications. It has been noted that DMFC performance has improved. Material of DMFC Component is the key factor for performance improvement DMFC. But Among all the component of DMFC current collector plates (CCPs) is a shank component as it contributes 80% weight in DMFC.DMFC not only depend on the material CCP but also depend on the shape, size and design of the CCP. This paper studied the material,shape and different structure of CCP used in DMFC to improve the performance of DMFC in details.

Recent advances in ultrasonic welding of dissimilar materials:A review

Shital Chintaman Jamunkar (Govt.college of engineering, Chandrapur)*

Aerospace and automobile industries are highly attracted towards lightweight construction. Advancement in the application of different lightweight materials is a skill that is strongly tied to bringing them together. conventional welding procedures has a limited control over grain size and delicate mechanical properties hence bonding of different materials has always been a difficult operation. Ultrasonic welding has been found as an effective technique to join large variety of materials with less cost and improved weld strength where the work piece to be weld together are applied with vibrations (ranging 20 KHz - 40 KHz) without use of any filler material. This paper focuses on the ultrasonic welding performed on different materials and optimization of welding parameters. Qualitative analysis of articles related to ultrasonic welding of dissimilar materials is carried out which explores the use of Ultrasonic welding technique to join large variety of materials.

Investigating the Impact of Water Content on Cement Paste Durability through Ultrasonic Testing

Hicham Mesbah (Faculty of sciences - Ibn Zohr University)*; Hicham Lotfi (Ibn Zohr University, Higher School of Technology); Mounir Tafkirte (Faculty of sciences - Ibn Zohr University); Hicham Banouni (Faculty of sciences - Ibn Zohr University); Mohamed Ettahiri (Faculty of sciences - Ibn Zohr University)

In this paper, we aim to investigate the relationship between water content and cement durability by examining cement paste using the water immersion technique to generate transmitted ultrasonic pulses. Our novel measurement method involves analyzing and processing ultrasonic signals transmitted by the cement paste, recorded at various angular orientations. This approach enables real-time monitoring of cement paste durability by identifying the critical angle and calculating the ultrasonic speed. Our findings demonstrate that water content significantly impacts ultrasonic velocity and directly relates to cement paste durability. By utilizing ultrasonic testing techniques that utilize the transmission method, we can observe the evolution of the time of flight of the cement paste, providing valuable insights into the material's durability as a function of the angles of incidence. Our results provide an important contribution to the understanding of cement paste properties and can inform the development of more durable and sustainable construction materials.

Correlations for c-ϕ Soils with DCPT and Laboratory test result

Batchu Ramanajneyulu (Jawaharlal Nehru Technological University Hyderabad)*

Due to unstoppable infrastructure development throughout the globe, the need of soil investigation became mandatory. Sometimes, collection of undisturbed soil samples from the existing in-situ conditions may not be possible. In certain instances, conducting extensive in-situ testing escalates the cost of project. To overcome those instances, the geotechnical engineers should be able to make necessary judgement with the limited test data through correlations between geotechnical parameters. There are established correlations for cohesive and cohesionless soils individually, but to make the predictions for cohesive-frictional soils, a few correlations are available in the literature. Hence an attempt is made to correlate field test data with laboratory test data under different moisture conditions as the moisture content plays an important role for c-ϕ soils. c-ϕ soils with percentage of fines varying from 10-20, 20-30, 30-40 and 40-50 were prepared in-situ at different moisture contents and densities and on these prepared ground, Dynamic cone penetration tests were conducted. The moisture content was chosen such it ranged between just below and just above OMC. Also, laboratory tests such as direct shear test and Atterberg limits were conducted on

soil samples collected from the prepared ground. The correlations were established between the DCPT, unit weight and shear parameters of soil. Various in-situ data available was compared with the established correlations and are found satisfactory. Soils having fines 10-20 and 20-30 are showing similar trend whereas the correlations developed for fines between 30-40, 40-50 are showing almost similar trend. The predictions showed that the correlations established are satisfactory for fines up to 30%.

Optimization of Eggshell Ash and Rice Husk Ash as Partial Replacement of Cement in M20 Concrete: A Comprehensive Investigation of Mechanical Properties

Yashwanth Pamu (CVR College of Engineering)*; Venkata Sarath Pamu (Oklahoma State University)

This study aimed to determine the optimal percentage of eggshell ash (ESA) and rice husk ash (RHA) for partial replacement of cement in M20 concrete. The research objectives focused on investigating the mechanical properties of concrete by replacing 10% of cement with ESA and RHA. While maintaining a constant 10% partial replacement of cement, different combinations of RHA and ESA were used, namely (2.5%+7.5% ESA, 5%+5% ESA, and 7.5%+2.5% ESA), relative to the weight of cement in the M20 mix. The experimental investigation involved assessing the impact of admixture on concrete cubes to determine their compressive strength. Notably, the mix containing 2.5% ESA and 7.5% RHA exhibited the highest compressive strength and split tensile strength at 7, 14, and 28 days under normal curing conditions. This optimal mix also contributes to reducing environmental pollution. Overall, this research provides valuable insights into the mechanical properties of concrete when partially replacing cement with ESA and RHA. The findings offer practical implications for sustainable construction practices and highlight the potential to mitigate environmental pollution.

Effect Of Gradation Of Aggregates On Mechanical Properties Of Dense Bituminous Macadam

Keshvir Singh Bali (Chandigarh University)*

The composition of aggregates in Dense Bituminous Macadam (DBM) is a crucial factor that affects the longevity and mechanical strength of the pavement. This study examines the effect of aggregate gradation on the mechanical properties of DBM GRADE-I using VG30 as a binder content, through the Marshall test and indirect tensile strength (ITS) test. The study compares the performance of DBM GRADE-I at the lower, middle, and upper limits of aggregate gradation, with a focus on achieving optimal mechanical properties.. The study uses a quantitative research design. By conducting various laboratory experiments, information was obtained, and the Marshall test was employed to identify the most suitable quantity of binder content necessary for the specific blend. This test also helped to identify the corresponding values of stability flow and air voids, which are critical parameters in assessing the mixture's quality and performance is of utmost importance.. To assess the tensile strength ratio of DBM, the ITS test was employed. The findings of the research indicated that at the middle and upper limit of aggregate gradation, DBM had improved mechanical properties. Specifically, the study found that the middle limit gradation performed well, showing the highest tensile strength ratio. The upper limit gradation also showed good performance, while the lower limit gradation performed poorly across all mechanical properties. Furthermore, the study found that the middle limit gradation resulted in the highest tensile strength ratio, indicating that this range is optimal for DBM. The study recommends the use of the middle limit gradation for achieving the highest possible mechanical properties of DBM. The study highlights the importance of optimizing aggregate gradation to achieve the best possible mechanical properties and provides guidance for road construction professionals.

Effect of aggregate gradation variation on mechanical properties of bitumen concrete

Ubaid Nazir Qureshi (Engineering)*; Sandeep Singh (Chandigarh university)

One of the nations with the largest road networks is India, where macadamized pavement-based roadways make up a great deal of the highways with a slim wearing course of bituminous layer, surfacing or a pre-mixed carpet. The majority of asphalt roadway components are made up of innately occurring materials, with aggregate accounting for more than 90 percent of the entire quantity of hot mixed asphalt (HMA). Bituminous Asphalt (BA) mixture is typically adopted as a top layer in the building of roads to disseminate tensions caused by considerably induced loading as well as defend foundational weakly connected surfaces from the destructive impacts of water. The rigorous compressed classification requirements designated by the MORTH assure that the BA mixture fulfils the essential standards for its anticipated function. The study was conducted with the goal to explore the attributes of (HMA) blends produced using Bituminous Concrete (BC) with grading II. Three different ranges of aggregate gradation (upper, middle, and lower) for BC grading II were utilized when creating bituminous mixes and Marshall Method of mix design was used to assess the mixes. It was found that the mixes with the median particle size distribution had a higher Marshall Stability value than the other mixes. Furthermore, it was discovered that the optimal amount of binding material rose as the granularity became smaller for each of the grading standards. Additionally, results revealed that BC II mixes at OBC's middle limit range recorded the highest TSR % (94.70), while the upper and lower limit ranges recorded values of 88.11 and 92.78 percentages, respectively.

Influence on ballistic limits of hybrid composite laminates under high velocity impact at different strain rates

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Advanced composite materials fabricated with Kevlar and basalt fibers are mainly preferred to produce body armor to assure reliability and security. These lightweight composite materials have high strength, penetration resistance, flexibility, and durability properties. In this study, to estimate the effect of strain rate on the composite body armor in terms of safety, a series of dynamic explicit analyses were conducted. In this numerical analysis, 9 mm full metal jacket (FMJ) projectiles with initial velocities ranging from 290 m/s to 450 m/s were used to characterize the high-velocity impact (HVI) behavior of various hybrid 3D composite laminates. Each hybrid composite panel was modelled with 16 laminae. The impacts were performed at three different strain rates: 1 s−1, 100 s−1, and 1000 s−1. A customized subroutine was developed specifically for 3D composite laminates to examine various failure modes in the modelled composites. The Johnson-Cook material model was used to simulate the behavior of the 9 mm FMJ projectile. The Yen criteria was used for the formulation of strain rate dependence. The hybrid composite panels consisting of various types including H8B8, H8K8, B8K8, and K16, were simulated using 3D solid elements. The ballistic limit of various hybrid composite panels was evaluated to define their HVI resistance. The results showed that when the strain rate increases from 1 s−1 to 1000 s−1, the ballistic limit of all composite panels increases. Among these hybrid composite panels, the body armor (B8K8) exhibited desirable ballistic performance

and energy absorption characteristics according to NIJ Standard 0101.06 when subjected to HVI at different strain rates ranging from 1 s−1 to 1000 s−1.

Effective Utilization of CaO in Cenosphere Based Concrete

Nilesh Suresh Zanjad (Government Polytechnic)*; Shantanu Pawar (GH Raisoni Institute of Business Management, Jalgaon); Chittaranjan Nayak (Vidya Pratishthan's College of Engineering Baramati)

Effective utilization of secondary product obtained from coal ash is the major attraction of researcher due to global issue of dumping ash on ground. Cenosphere is the new material; in-built with major physical and chemical characteristics which open up many new ways in future technology in construction. Application of cenosphere along with cement reduces density which makes material light and sound. In present work cement is replaced by cenosphere with 2.5%, 5%, 7.5% and 10% to examine physical and mechanical properties of concrete. Due to fineness of cenosphere it shows little improvement in strength upto replacement of 2.5% cement, but later it reduces strength significantly. After doing chemical and microstructural examination it is found that amounts of calcium oxides (CaO) is very less which make concrete sample unsound. For greater improvement in mechanical properties; CaO which obtained from calcium lactate with 0.010 mol/lit and 0.015 mol/lit is added in concrete mix along with cement replaced by cenosphere. The obtained result shows at 10% replacement of cement with cenosphere achieves 5.37% and 6.24% reduction in density, 2.86% & 6.21% higher compressive strength, 9.18% and 11.21% increase in flexural strength, 4.02% and 9.77% increase in tensile strength, this shows achievements of ecofriendly, lightweight, sound and durable material mix for construction industry

Comparative Study on the Workability and Strength Properties of Metakaolin Concrete Reinforced with Basalt Fiber

Nihar Ranjan Mohanta (NIT Raipur)*; Suresh Kumar Paul (NIT Raipur); Subhadarshani Satapathy (Centurion University of Technology and Management, Paralakhemundi); Dibyajyoti Dash (NIT Raipur); Abinash Das (PARALA MAHARAJA ENGINEERING COLLEGE, BEHRAMPUR)

This manuscript reports the findings of metakaolin (MK) concrete with and without basalt fibre (BF). The current research aims to evaluate the influence of BF on the workability and hardened properties of MK concrete, providing valuable insights for optimizing the mix design and achieving enhanced performance.MK was used as a partial substitution of 2%, 4%, 6%, 8%, 10%, 12%, and 14% of the cement in concrete to create metakaolin concrete (MKC). Furthermore, basalt fibre with an aspect ratio of 50 was used in MKC. The different parameters such as workability, compressive strength (CS), split tensile strength (STS), ultrasonic pulse velocity (UPV), and rebound hammer (RH) test were conducted initially by substituting cement with MK for 7, 28, and 56 days of curing. Afterward, various percentages of BF, i.e., 0.15%, 0.2%, 0.25%, and 0.3% of the weight of the volume of concrete, were used to test the combined efficiency of MK and BF in concrete. The outcomes of this study unveil the significant influence of basalt fibre on the workability and strength properties of metakaolin concrete. It was noticed that the concrete strength is enhanced up to 8% presence of MK and dropped beyond that. The optimum result was obtained with 8% cement replacement with MK and 0.2% BF. The strength of MKC was further enhanced by adding BF to various percentages of MK. The results revealed that using BF and MK significantly impacted the concrete's strength behavior. The incorporation of MK not only reduces the amount of cement content in concrete but also provides better strength behavior of concrete. The findings of this research offer invaluable insights into the design and construction of sustainable and high-performance concrete structures.

Effect of red mud reinforcement on the microstructural and mechanical properties of al 7075/red mud composites

PRIYESHIV KUMAR GURMAITA (NIT NAGALAND)*; Rosang Pongen (NIT NAGALAND)

In the present Study, it has been attempted to create Al7075 aluminium alloy with reinforcement. of red mud various weight percentage of 5%,7%,9% and 11% using stir casting rout. Mg added as a flux, to overcome the wetting problem between red mud and liquid metal. The samples of Al7075 Composite were tested for tensile, compression, hardness, impact strengths from the experimental investigation.it has been observed that the tensile, compression, hardness, impact strengths of the reinforced composite could be increase by adding reinforcement compare to the base alloy. It has been attempted to create Al7075 aluminium alloy with reinforcement. microstructure of samples was investigated. Microstructural characterization was examined by optical (OP) and scanning electron microscopy (SEM).

Studies on Open Hole Tensile Testing on Jute/Epoxy Composites with Varied Hole Diameters

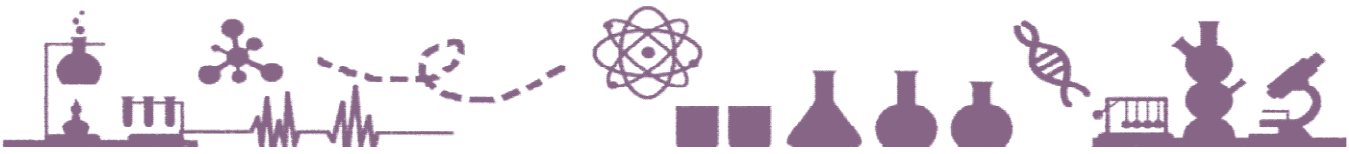
Sunith Babu (Ramaiah Institute of Technology)*; Bharath M R (Ramaiah Institute of Technology); Girish Kularkni (Ramaiah Institute of Technology); Rajesh Mathivanan (PES University); Meghana A (Nitte Meenakshi Institute of Technology)

This research paper delves into the exploration of Jute/Epoxy composites, a material of growing interest in the automotive industry. Jute, a natural fiber, is gaining preference due to its cost-effectiveness, renewability, and satisfactory mechanical properties. These attributes make it a compelling alternative to synthetic fibers in automotive applications. The study also emphasizes the importance of hole drilling, a secondary but crucial process in manufacturing. This process is integral to the assembly of various automobile parts, and its impact on the mechanical properties of composite materials is often underestimated. The core of the research investigates the effects of open-hole tensile testing on Jute/Epoxy composites, with a particular focus on the impact of varying hole diameters. The diameters examined in the study were 6mm, 9mm, and 12mm, with a constant loading rate of 1mm/min maintained throughout the testing process. The primary finding of the research was a significant decrease in tensile strength with an increase in hole diameter while keeping the thickness constant. This inverse relationship between hole diameter and tensile strength is a vital consideration in the design and manufacturing processes of composite materials. The findings of this study underscore the need for careful consideration of hole diameter during the hole-drilling process. This factor directly influences the tensile strength of the composite material, thereby affecting the overall performance and safety of the automobile. The insights provided by this research are invaluable for manufacturers and engineers in the automotive industry, contributing to the development of safer and more efficient vehicles."

Polymer based cement nano composite for strain monitoring applications

Roopa AK (KLE technological University)*; Anand Hunashyal (KLETU); Mohammed Furquan Mulla (KLE Technological University); Fardeen Gudugi (KLE Technological University)

The nano technology has potential applications in development self-sensing smart materials. The carbon nanotube and graphene possess excellent piezo electrical properties. These nano materials is used in cement matrix or polymer base to improve the mechanical and piezo electrical properties of composites. The polymer cement



composites is prepared by adding epoxy resin into cement mortar which prolong the formation crack and improve the strength of concrete. In the present study, the graphene and carbon nano tube are added in matric, which acts as the co binder and conductive filer into polymer cement composites. Cement polymer composites are prepared by introducing carbon fibre, epoxy resin by altering the carbon nano tube and graphene as conductive filler in matrix to prepare the two distinctive specimens for experimental investigations. The electro mechanical test were carried out to assess the piezo electrical properties of these composites subjected gradual increase of mechanical loading such as flexural and compression. The present study describes the self-sensing capability of composite to monitor the strain in structures. The experimental test elucidates the addition of epoxy in cement matrix promotes the mechanical properties while carbon nano tube and graphene proves to be promising smart self-sensing materials in composites by measuring the variation in strain at critical regions. The SEM with EDX analysis show the epoxy resin act as binding agent which hinder the cracks propagations. The proper dispersion of nano materials forms the effective conductive network within composite which enhance the electrical properties of composites.

Cement based nano composite Energy Absorption Damper to improve the damping properties of concrete and monitoring applications

Roopa A K (Kletu)*; Anand Hunashyal (KLETU); Sandhya Jalgar (KLETU)

The energy from the moving seismic waves through a building structure is dispersed by means of dampers. Dampers works converting the kinetic energy into heat energy which then dissipates into the hydraulic fluid. Damper systems designed and manufactured with a view of protecting structural integrity, reducing structural damage, and preventing injury to people by absorbing energy from earthquakes and minimizing deformations in the structure. The vibration-reducing capabilities are crucial for the safety of infrastructures. In recent years, material science field enables the fabrication of innovative cement composite damper with greater energy-absorbing abilities to control the vibrations. The most effective way to achieve the good vibration damping by tailoring the construction materials such as cement with nanomaterials like Silica, Alumina, Graphene, CNTs, etc. This paper focus on development of vibration damper, prepared by cement nano composite containing MWCNTs and Carbon fibers. The experimental tests are conducted such as Impact Test, Flexural test, Compressive strength test, and Steel Ball free-falling test by placing these dampers in to beam to investigate its energy absorbing capacity and its strength and durability. The microstructural analysis SEM and XRD is performed to know the morphology of concrete mix with MWCNTs and Carbon fibers on damping mechanism. The results of the Impact test indicate that the beams without MWCNTs and CFs exhibited an average energy absorption of 248 J, while those with MWCNTs and CFs absorbed an average energy of 262 J which shows almost 15% more energy absorption. It is also the same with the Steel Ball free Falling test. The addition of nanomaterials in a cement matrix improves concrete's frictional damping energy consumption ability and also increases the energy-absorbing properties, flexural strength, and compressive strength of structures.

2D Material – Molybdenum DiSulphide Role in Energy Generation – A Review

Shruti Gatade (Nitte Meenkashi Institute of Technology)*; Dawnee Soman (M. S Ramaiah Institute of Technology); Rushitha Atla (M S Ramaiah Institute of Technology)

Two-dimensional (2D) transition metal dichalcogenides (TMDs) that resemble graphene are becoming important because of their intriguing semiconducting and photonic characteristics. In terms of TMDCs, molybdenum disulphide (MoS2) is one of the most prevalent. The functional characteristics of MoS2 and graphene are

remarkably similar, including their high charge carrier transport, strong resistance, and good mechanical strength and friction. Since, its 1.8 eV direct band gap in monolayer and layer dependency of band structure as compared to graphene's bandgap issue, making it important for both research and industry. In the fabrication of heterojunction solar cells, layered MoS2 has been used as the hole-transport layer (HTL), electron-transport layer (ETL), interfacial layer, and protective layer. This review intends to present 2D MoS2 future material for and generation applications, focusing the performance of atomically thin MoS2 layers in solar cell devices such heterojunction, organic, DSSC, and perovskites-based solar cells that are a crucial component for a clean and abundant source of energy. With a high power conversion efficiency, the MoS2-based materials have a lot of potential for solar cell devices.

Effect of Nano-sized Reinforcement on Mechanical Properties of Aluminium Matrix Composites

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The present research work is aimed towards synthesis and characterize the high specific strength Aluminium matrix nano-composite (AMNCs) for automotive applications. Graphene nanoparticles were prepared through sol-gel process from graphite powder. Physical characterization of the synthesized product was carried out by X-ray diffraction technique and scanning electron microscope. The AMNCs were fabricated through powder metallurgy process by adding different wt. fraction of the graphene nanoparticles with the pure aluminium into a closed die under high compaction pressure. The compacted specimens were then sintered at various temperature for different duration under open air atmosphere. Microstructure of the fabricated AMNCs were observed in an inverted optical microscope and grain size was measured through metallurgical image analysis software by following the ASTM standards. Hardness test of the fabricated AMNCs were carried out by Vickers Micro-hardness testers (BHT-1000) and hardness values were measured by the integrated software, Vidas 2.0. The mechanical properties AMNCs also have been compared with the mechanical properties of Aluminium matrix composites (AMCs) of same wt. fraction reinforcement. It is interestingly observed that mechanical properties of AMNCs are more improved as compared to the AMCs irrespective of wt. fraction and process parameters of powder metallurgy process; however mechanical properties of AMNCs increases with increase in wt. fraction of nano reinforcement and process parameters.

Evaluation of Binding Potential of Permethrin Pesticide with Blood Serum Protein using Multiple Docking Tools

Shweta Singh (Amity University); Priyanka Gopi (Amity University); Prateek Pandya (Amity University Uttar Pradesh); Jyoti Singh (Amity University)*

Permethrin, a pyrethroid insecticide widely utilized, has been recognized for its toxic effects on a range of organisms, encompassing insects, aquatic life, and mammals, including humans. Molecular docking simulations were performed to assess the theoretical binding affinities of Permethrin (PMT) with the Human Serum Albumin (HSA) target using various molecular docking software's. The objective of these simulations was to evaluate the potential binding strengths of the pesticide with the target protein. The findings demonstrated that the calculated binding affinities of the PMT- HSA complexes obtained from the three docking web servers ranged from -8 to -8.9 kcal/mol, indicating a high degree of potency. Among the docking web servers, CB Dock yielded the most favorable

docked pose with the lowest binding affinity. In addition, ADMET (Absorption, Distribution, Metabolism, Excretion, and Toxicity) was used to understand the ADMET profile of PMT for predicting its behavior. The application of in-silico ADMET technique revealed that PMT is an environmental toxin and has a potential to cause respiratory toxicity and skin toxicity in non-target organisms.

Modified QuEChERS based optimization method coupled with LC-MS/MS for quantification of Dinitramine herbicide from biological matrices

Majji Sai Sudha Rani (Amity University Uttar Pradesh); chintan Singh (Amity University Uttar Pradesh); R K Sarin (National Forensic Science University); Prateek Pandya (Amity University Uttar Pradesh)*

Herbicides are chemical compounds specifically formulated to impede the growth of undesired plants or weeds. The market for herbicides is expanding rapidly, driven by the ongoing need to effectively manage weed control in agriculture. Dinitramine (DIN), herbicide belonging to the dinitroaniline family, exhibits toxicity towards the humans and causes potential health risks. However, despite its significant toxicity, there is currently a lack of an analytical framework for the detection and quantification of DIN from biological matrices. Therefore, forensic analytical toxicology needs efficient sample preparation methods that are effective, automated, and environmentally friendly for detecting herbicides. One such alternative is the QuEChERS extraction method which enables the separation of aqueous and organic phases, resulting in cleaner extracts compared to other available extraction methods. In this study, tandem liquid chromatography mass spectrometry (AGILENT 6470B) was coupled with a modified QuEChERS technique to quantify the presence of herbicides in biological matrices viz., saliva, urine, and gastric fluid. The analytical column temperature was maintained at 40°C, and the injection volume of the test sample remained constant at 10 µL, with concentrations ranging from 5 to 200 ng/mL. All standards were quantified within 15% of the target using the calibration curve, which had an 'r' value of > 0.99 and the method was further validated for accuracy and precision which were in the desired range according to SWGTOX guidelines. The limits of detection and quantification of DIN was established to be in the range of 3.08-20.037 ng/mL and 19.56 - 60.72 ng/mL, respectively. In conclusion, this study successfully extracted DIN from biological matrices with a high recovery rate of > 79%. The developed bioanalytical approaches can be utilized to quantify pesticide exposures in agricultural settings, as well as for forensic and clinical purposes.

Current study of new research trends in an inorganic lead free materials based on perovskite thin film solar cell – A short Review

Juhi Padma (Centre for Advanced Studies Lucknow)*;Saurabh Mishra (Centre for Advanced Studies, Lucknow); Ujjawal Singh (Indian institute of Technology, Banaras Hindu University Varanasi)

The productive conversion of solar energy to electricity for consumption by humans primarily depends on the advancement of solar cells. In recent time, new varieties of high-performance solar cells are continually being developed. In the rapidly growing photovoltaic sector, thin film solar cells comprised of inorganic lead free perovskite materials have been one of the key categories of solar cell exhibiting potential. The inorganic lead free perovskite materials have boosted the development of economical thin film solar cells. The remarkable expansion in power conversion efficiency greater than 25%, appropriate optoelectronic properties and easiness of the fabrication technique have initiated the aspiration to think thoroughly about the commercialisation step. However, the main barrier is the lead toxicity and low stability. Large-scale commercial applications of lead-based halide perovskites in solar cells are hampered by their toxicology problem. Toxic lead has to be removed immediately

from the current generation of perovskite solar cells (PSCs). Therefore, taking into account all inorganic lead-free materials is a tremendous step toward commercialization. Here, we provide an all-inorganic, stable solar absorber that is lead free and friendly to the environment. We discuss significant emerging and typical inorganic lead free photovoltaic materials in this work to give an overall understanding of and insight into the future direction of inorganic lead free thin-film solar cell development. The development of device structure, absorber materials, present performance bottlenecks, and important long-term performance increase techniques are all described in this study.

Effect of mold size and heat transfer coefficient on casting and solidification of 5754 aluminum alloy- A comsol approach

Mohit Joshi (Malaviya National Institute of Technology-Jaipur)*; Nikunj Patel (Malaviya National Institute of Technology-Jaipur); Dr.Ajaya Kumar Pradhan (Malaviya National Institute of Technology-Jaipur)

This research paper examines the effect of mold dimensions and the surrounding atmosphere on the casting and solidification of 5754 aluminum alloy. Comsol multiphysics software is used for simulating temperature distribution during casting and solidification. Temperature and isothermal counters are simulated for different mold dimensions and surroundings (with other heat transfer coefficients). A cylindrical mold diameter from 5 mm to 25 mm is taken. Air, water, water at high pressure, etc., with different heat transfer coefficients, are accepted. As mold size increases from 5 mm to 25 mm, the reduction in temperature (heat loss) reduces. Small molds have a small amount of material and less heat capacity. The time to achieve 27 °C reduces from 76 minutes (25-1 sample) to 20 minutes (25-1 sample). The average Cooling rate (°C/s) increases from 0.1739 °C/s (for 25-1 sample) to 0.6608 °C/s (for 5-1 sample). Due to the higher heat transfer coefficient, temperature reduction is much higher. Heat loss increases, and temperature rapidly drops as the surrounding atmosphere's heat transfer coefficient rises. 27°C is attained in 9.25 s (for boiling water) instead of 4560 seconds (for still air). The average Cooling rate increases from 0.1739 °C/s (for still air) to 85.7297 °C/s (for boiling water).

Heat transfer comparison by different fins designs using Ansys simulation

Mitushi Agrawal (Malaviya National Institute of Technology, Jaipur)*; Gaurav Nandkishore Mittal (MNIT Jaipur); Nikunj Patel (MNIT Jaipur); Ajaya Kumar Pradhan (MNIT Jaipur)

Heat transmission via heat fins has been explored in great depth using a variety of different fin shapes and characteristics. The influence of the surface area of fins on the thermal performance of fins is something that is being explored. In this research, a comparison of the heat transmission capabilities of various fin designs is made. On the rear surface of the fins, a constant temperature of 500 °C is maintained, and convection heat transfer at a rate of 10 W/mm2 is maintained on all surfaces of the fins. For the purpose of simulating heat transfer and calculating temperature and heat flow at each site, the Ansys workbench is used to perform steady-state thermal analysis. The amount of outside surface area that a fin has determines how well it performs as a thermal barrier. Increasing the surface area of the fins improves their thermal performance. Sample M, a hollow cylinder with a diameter of 2 mm, has the most significant temperature difference at 17.92 °C, while sample L, a hollow cylinder with a diameter of 1 mm, has the greatest heat flow at 0.5712 W/mm2. The final results show that sample M performs the best for heat transmission."

Optimization of FDM Printing Parameters for Square Lattice Structures: Improving mechanical characteristics

Logesh Kothandaraman (Saveetha School of Engineering)*; Navin Kumar Balasubramanian (Saveetha School of Engineering)

Integrating lattice structures into the design of products manufactured using Fused Deposition Modeling (FDM) can enhance the weight and strength ratio of printed objects. In this research, the square lattice structure, widely employed in plane lattices, is utilized. Polylactic Acid (PLA)is been chosen as the feedstock material for FDM printing due to its favorable properties, including biocompatibility, biodegradability, controlled degradation, sterilization, and mechanical characteristics. The researchers use the Taguchi optimization technique to optimize the printing parameters for the square lattice structure. They design experiments based on identifying the factors that have the most significant impact on the printed objects, which they determine through a thorough literature survey of similar work.L9 orthogonal array is been utilized to design experiments, requiring three factors with three levels each: layer height (0.1, 0.2, and 0.3mm), printing temperature (190, 200, and 210°C), and printing speed (50, 75, and 100mm/s). This arrangement enables them to conduct nine trial runs to determine the optimal printing parameters for better mechanical characteristics. This research aims to optimize FDM printing parameters for the square lattice structure, focusing on enhancing printed objects' weight and strength ratio. The research improves productivity and material utilization and holds relevance in medical applications. The advancements achieved through this research can benefit industries that require exceptionally lightweight and durable medical components, implants, and scaffolds.

Investigation And Optimization Of Parameters On Blanking Die Design And Its Effective Lifetime

ümit aldemir (yildiz tecnichal university)*

Blanking die production is widely used in the industry for the production of parts with complex geometry and sharp corners in sheet metal forming and blanking processes. For the geometry of the desired workpiece, it is plastically deformed by using high stresses during blanking. It is very important to determine the punch-die design and working parameters to ensure good performance. In fine blanking, the wear of the mould greatly affects the quality of the product as well as the life of the mould. It is known that the die life is in a non-linear relationship with the number of blanking strokes during the working life. In this study, in order to improve the tool wear, the wear values on the die-punch, the surface roughness change, the volume loss and the improvements in the punch edge rollover of the parts with complex geometry and sharp edges in thin steel sheets are focused on.

Rotation Effect in a Darcy Couple-Stress Nanofluid Heated and Soluted From Below

Rahul Kumar (S. D. (P. G.) College, Muzaffarnagar Uttar Pradesh India)*

This study develops a problem of thermosolutal instability in a Darcy couple-stress nanofluid layer. The fluid layer is assumed to be held within free-free boundaries. A modified Darcy model has been implicated for porous medium. The fluid layer is subjected to rotation along z- axis. The linear stability theory has been performed using the normal mode method .The numerical solution is obtained by applying the Galerkin method for the case of stationary convection. The effect of physical parameters governing the system like modified Taylor number, a

parameter of couple-stress, a Lewis number for thermo-nanofluid, modified diffusivity ratio, a Lewis number for thermo-solutal have been investigated and shown analytically and graphically.

Ultrasonic assisted chemical machining

Muhammed Fatih Odabaşı (Yildiz Technical University)*; Orhan Cakir (Yildiz Technical University)

Chemical machining is one of the basic non-traditional machining methods, material removal is based on controlled corrosion. The selected chemical solution which is called etchant is employed to attack material in a corrosive environment. Ultrasonic-assisted chemical machining is a kind of hybrid machining method to increase the performance of the basic method. In this study, AZ31B magnesium alloy is machined by this method and the effects of selected chemical machining parameters (temperature and etchant type) on the surface roughness and depth of etch will be investigated. Two different etchants (HCL and HNO3) are used at two different chemical machining temperatures (25°c and 50°C).

Analysis effect of surface roughness in bipolar plate geometry using cfd

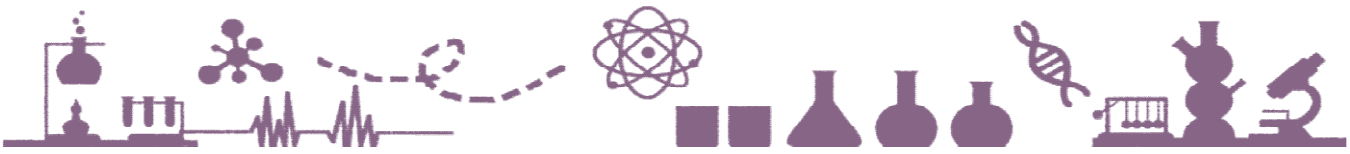
Mirac Peza (Yildiz Technical Unvieristy)*; ORHAN ÇAKIR (YILDIZ TECHNICAL UNIVERSITY)

In this study, a numerical analysis was conducted to investigate the effects of surface roughness to fuel cell plate. For this purpose, will be tested 1µm ,3 µm and 5µm surface height on bipolar plate geomtery.Current collector plates with different geometries were combined with different assumptions, and three different main model fuel cell geometries were created. Accordingly for geometry Model-1, Model-2 and Model-3, geometries were determined as circle, square and triangle. Using these model geometries, simulations were conducted for three different surface roughness with velocity of fluid 0.8 m/s .Due to analysis we aim to determine which geometry shape designed with be better and with more benefits. The results of three shapes will bo compared with each other and trying to make improvements.

Study of Wear behaviour of Al7075-Zirconium Silicate Composites produced by Stir Casting Method

Hemanth Raju T (New Horizon College of Engineering)*; Udayashankar S (VTU)

The uses of metal matrix composite are quite important, particularly in the automotive and aerospace industries. Aluminium is widely regarded as the most lightweight of all the many types of metal. Aluminium metal matrix composites, also known as AMMCs, have become more important in engineering applications as a result of the excellent features that they possess. These properties include low density, high stiffness, high resistance to corrosion, high strength, and good structural rigidity. Applications in the fields of aerospace, automotive manufacturing, and marine engineering all make use of metal matrix composites with Aluminium 7075 as the base matrix. The purpose of this study is to investigate the wear characteristics of aluminium matrix composites that have been reinforced with various mass fractions of zirconium silicate particles and have been fabricated using the stir casting technique. Dry sliding wear tests of Al7075-zirconium silicate composites were carried out with the assistance of a pin-on-disc testing equipment. The tests were carried out with a variety of parameters, such as load, sliding distance, and sliding velocity, being taken into consideration. Utilising a scanning electron microscope, the microstructure of the newly developed composites is investigated . The microstructural analysis demonstrated that the zirconium silicate particles were dispersed uniformly throughout the matrix, and that there was a strong bond between the matrix and the reinforcement. The findings of the tests showed that the produced composites exhibited lower wear rates than



Al7075 alloy. Studies conducted using a scanning electron microscope on the worn surfaces showed that an improvement in wear resistance can be attributed to the production of finer debris.

Drilling of Composite Materials Used in Aircarft Industry – Brief Review

Necdet Yakut (Istanbul Aydin University)*; Orhan Cakir (Yildiz Technical University)

Composite materials are essential materials in various industries, including aviation, automotive, defense, marine vehicles, sports equipment, and other sectors where lightweight structures and superior performance under challenging conditions are crucial. These materials are often manufactured close to the desired final shape, and drilling is commonly utilized for their assembly. The drilling process of fiber-reinforced polymer composites is highly complex due to the nature of these materials. In the process of drilling composite plates, control of process parameters, tool geometry, tool material, and coating are of outstanding importance. Additionally, optimizing the drilling process is frequently selected to reduce operation time and costs. Understanding the impact of process parameters and the tool used on hole quality is crucial to minimize drilling discrepancies that often lead to the rejection of polymer-based composite parts. This study addresses the parameters that affect hole quality in fiber-reinforced polymer composite materials and provides information about an optimization method that brings together these parameters accurately and improves hole quality. The input parameters considered in this study are feed rate, cutting speed, drill geometry, drill material, and coating material. The output parameters selected are delamination factor and surface roughness. Therefore, the influence of input parameters on output parameters is presented in detail. The study also discusses the Taguchi method, which is widely used for parameter optimization.

Influence of Zirconia Particles on the Mechanical Characteristics of Al7075-Zirconia Metal Matrix Composites

Hemanth Raju T (New Horizon College of Engineering)*; Udayashankar S (VTU)

The growth of the manufacturing sector has in some way contributed to the rise in the application of aluminium metal matrix composites (AMMCs). Because of its exceptional mechanical and tribological qualities, AMMCs are gaining a lot of interest in a variety of industries all over the world, including the automotive, architectural, and aerospace industries. In the current experiment, the Al7075-Zirconia composites were efficiently produced by employing the stir casting process. The percentages of zirconia used in the production of the composites ranged from 0% to 20%, with 5%, 10%, 15%, and 20% respectively. Scanning electron microscopy is used to carry out an investigation of the microstructure of the newly produced composites. In order to evaluate the mechanical properties of the newly developed Al7075-Zirconia particle composites, tests for hardness, tensile strength, and compression strength were carried out. The Brinell hardness testing machine is utilised in the course of the hardness test. The universal testing machine is utilised in order to perform the tensile strength test as well as the compression strength test. All of the tests, including hardness, tensile strength, and compression strength, are carried out in accordance with the ASTM standards. Zirconia particles were found to be present in the aluminium matrix, as determined by the microstructure investigation. In addition to this, it demonstrates that the zirconia particles are dispersed uniformly throughout the aluminium matrix. The results of the hardness test, tensile strength test and compression strength test showed that the BHN, the ultimate tensile strength and compression strength of the Al7075-Zirconia composites are greater than that of the Al7075 matrix alone.

Drilling of Aircarft Composite Materials – Brief Review

Necdet Yakut (Istanbul Aydin University)*

Composite materials are essential materials in various industries, including aviation, automotive, defense, marine vehicles, sports equipment, and other sectors where lightweight structures and superior performance under challenging conditions are crucial. These materials are often manufactured close to the desired final shape, and drilling is commonly utilized for their assembly. The drilling process of fiber-reinforced polymer composites is highly complex due to the nature of these materials. In the process of drilling composite plates, control of process parameters, tool geometry, tool material, and coating are of outstanding importance. Additionally, optimizing the drilling process is frequently selected to reduce operation time and costs. Understanding the impact of process parameters and the tool used on hole quality is crucial to minimize drilling discrepancies that often lead to the rejection of polymer-based composite parts. This study addresses the parameters that affect hole quality in fiber-reinforced polymer composite materials and provides information about an optimization method that brings together these parameters accurately and improves hole quality. The input parameters considered in this study are feed rate, cutting speed, drill geometry, drill material, and coating material. The output parameters selected are delamination factor and surface roughness. Therefore, the influence of input parameters on output parameters is presented in detail. The study also discusses the Taguchi method, which is widely used for parameter optimization.

Mechanical Properties of High Strength Self Compacting Concrete with different mineral admixtures: An Experimental Investigation

Dinesh Nomula (Cvr College Of Engineering)*; Jagadeesh Bommisetty (Cvr College Of Engineering); Sai Keertan Tirukovela (Cvr College Of Engineering)

The research work related to High strength self-compacting concrete (HSSCC) is growing exponentially along with the scope and area of HSSCC applications. Various specifications and standards are also being developed and revised. Compared to that for conventional concrete, a higher energy is required during the mixing of HSSCC. The primary objective of this study is to perform the experimental investigations on mechanical properties of High strength fiber-reinforced self-compacting concrete. Different initial trail mixes were prepared by using packing density method. Proportion of the PVA (polyvinyl alcohol fibers) was fixed at 2% based on the literature with varying contents of multiple Supplementary Cementitious Materials (SCMs) like GGBS, fly ash and silica fume. The performance of concrete specimens is examined and compared with steel and polyvinyl alcohol (PVA) fibres. The mechanical characteristics of a material, such as its compressive, split tensile and flexural behaviour were studied and the mechanical and performance differences between HSSCC made up of various fibers and SCMs is observed and necessary conclusions are drawn.

Simultaneous Determination Of 4 Anti-Convulsant Drugs From Urine Utilising DLLME-LC-MS/MS

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Epilepsy, also known as “The Falling Sickness”, is a neurological disorder that occurs due to nerve cell disruption which results in improper signal transferring leading to seizures. Occurrence of abuse of Anti-convulsant drugs (ACDs) is increasing day-by-day, so the need of detection of these drugs due to their involvement in forensic cases. In this research paper, Dispersive Liquid-Liquid Microextraction (DLLME) has been used for extraction of 4

ACDs- Lamotrigine (LMG), Oxcarbazepine (OXC), Valproic Acid (VA) and Topiramate (TPM). Ultrahigh Performance Liquid Chromatography Tandem Mass Spectrometry (UHPLC-MS/MS) was employed to analyze data utilizing multiple reaction monitoring (MRM) from biological matrix encountered in forensic and clinical scenarios. Linearity was obtained in the range of 5 – 200 µg/L for the targeted drugs. LOD and LOQ for the analytes were in the range of 7.5844 µg/mL to 12.1447 µg/mL and 22.9831 µg/mL to 36.8022 µg/mL. This method resulted in the highest recovery of 73 to 119 % for targeted drugs as compared to other published methods. The complete process followed ICH guidelines for optimization and validation of method.

Evaluation of Blended Geopolymer Concrete using Waste Ceramic Tiles as partial replacement of aggregates

Saurabh Sunil Naik (G H Raisoni Institute of Engineering and Business management Jalgaon)*; Shantanu Pawar (G H Raisoni Institute of Engineering and Business management Jalgaon)

Utilizing waste and creating sustainable building materials is need of the hour for CO2 reduction and conversion to products. A new class of energy efficient building materials called Geopolymer Concrete has the potential to replace conventional cement concrete-which consumes a lot of energy. In the present study, waste ceramic tiles were utilized as partial replacement to coarse aggregate for evaluating the qualities of blended geopolymer concrete. In comparison with normal geopolymer concrete, fly ash was blended with Alccofine 1203 and was used with aggregates being partially substituted with waste ceramic tiles, when cured at room temperature, had resulted better strength. Compressive strength variations were evaluated on a variety of Blends for Alccofine 1203® and waste ceramic tile replacements with conventional coal fly ash, sand aggregate and alkaline activators. The optimal ratios for the highest compressive strength of blended geopolymer concrete were observed to be at 15% and 20% combined for the variable quantities of Alccofine 1203® and waste ceramic tile replacements. Variations in strength were observed with the variations in amount of waste ceramic tiles as a coarse aggregate. Additionally, it is evident that the qualities of concrete are not noticeably harmed by the use of discarded ceramic tiles. The results of the numerous samples that were seen were noticeably good, and as a result, it has a great deal of promise for use as a building material in a variety of applications, including paver blocks, bricks, concrete, etc. minimizing the solid waste dumps.

Influence of Steel Fiber (SF) Addition on the Enhancement Compressive Strength of Pure Gypsum

Sinan Ibrahim (Mustansiriyah University); Ahmed Aljubory (Mustansiriyah University); Nabil Jassem (Mustansiriyah University); Zuhair Hacheem (Mustansiriyah University); Karim Gubashi (Mustansiriyah University); Mohammed Jameel (Mustansiriyah University); Hameed Ali (Mustansiriyah University); Mohammed Mohialdeen (Mustansiriyah University); Mahdi Alak (Mustansiriyah University); Ahmed AL-Ridha (Mustansiriya University)*

This research examines how reinforcing pure gypsum with steel fiber (SF) changes its compressive strength. Six pure gypsum-only mixtures will be used in the study. There are two groups of these mixtures, with water-to-gypsum ratios of 0.6 and 0.7, respectively. Steel fiber volume fractions of 0%, 0.15 %, and 0.3 % were used to subdivide each group into three subgroups further. For every group, three samples were taken in 50x50x50 mm cubes. Steel fibers added to pure gypsum mixtures were shown to boost compressive strength for both water/gypsum ratios, with the percentage increase increasing with the water/gypsum ratio. However, the compressive strength decreases for all volume fractions of steel fiber as the water/gypsum ratio rises.

Simultaneous Optimization of Product Quality and Productivity for Multi-Factor designs of Circular Cross-Section Conformal Cooling Channels in Injection Molds

Laura W. Simiyu (JKUAT)*

The widespread use and demand for plastic products worldwide have caused manufacturers to covet high productivity and product quality. Most plastic products are produced using the injection molding technique. This technique is characterized by long cooling times, which affect the production cycle and product quality. Literature reveals that cooling in injection molding can be significantly affected by the design of the cooling channels. This study is, therefore focused on multi-factor design optimization of circular cross-section conformal cooling channels for multiple responses. The Taguchi design of experiments approach was adopted in this study. The key variables of conformal cooling channels that were studied involved diameters, depths, and pitches. Solidworks® was used for 3D design, and for numerical simulation to determine the cooling time, volumetric shrinkage, warpage, and sink marks. Multi-response optimization was then conducted using the Taguchi-Grey Relational Analysis technique. Results show that the optimal cooling channel design has a minimum; diameter of 8 mm, depth of 12 mm and pitch of 16 mm. Additionally, Analysis of Variance (ANOVA) revealed that the diameter is the significant cooling channel design parameter that contributes to all the responses concurrently with the largest percentage of 80.26 %. Comparing the conformal with straight cooling channel designs, superior performance was noted for the former against the later with optimal design recording an improvement of 29.35 %, 5.99 %, 19.77 %, and 38.85 % in the cooling time, volumetric shrinkage, warpage, and depth of sink marks respectively.

Seismic Analysis And Comparison Of Multi Storied Building With And Without Dampers Using Etabs

Mohammed Sadeq Al-sabaeei (G. H. Raisoni College of Engineering)*

Design practice for seismic design of buildings using conventional methods reduces the effect of forces to an elastic level and below, to improve the significance of potential energy of dissipation, the structure has to be suitably designed to achieve efficiency and withstand stability for severe earthquakes in critical zones. To provide greater resistance towards earthquakes, studies are performed using base isolation and providing dampers to the building so that the transmission of forces at the ground will develop the movement in isolation and protect the building by dissipation of energy. This paper studies the functioning of different damper systems like viscous and pendulum dampers to identify the efficient kind of damper system. A multi-storied building is modeled with dampers and studied seismic responses using ETABS software

Review Paper on Seismic Comparison Of Different Types (V, DIAGONAL, AND X) OF BRACINGS ON Different Shapes Of Buildings (L, H, T, AND RECTANGULAR) with response spectrum method

Mohammed Sadeq Al-sabaeei (G. H. Raisoni College of Engineering)*

An unexpected release of energy due to the movement of plates or rocks in the ground which one by one causes earthquakes. Various bracing types were used in the structure to perform seismic design to improve the performance of the frame structure. i.e., X-shaped, Inverted-V-shaped, ZX-shaped, Inverted-V-shaped frame is a conventional concentric frame type. The behavior of this arrangement will be controlled by the compression of braces of the first story, resulting in the localization of the failure and the loss of horizontal resistance. This paper discusses about the observed behavior of irregular building structures for different plans such as rectangular, H, L,

and T. Modelling of 25 levels of RCC frame building will be done in ETABS software for analysis. The maximum shear force, bending moment, and maximum story displacement are calculated and then compared for all analyzed structures.

Effect of Alloying Element on Mechanical Properties of Aluminium Alloy Matrix Composites

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The present research work is focused on synthesis and characterization of an Aluminum Alloy matrix-based composite (AAMCs) for automotive industries applications. AA7079 Aluminum Alloy is used as raw material and different weight fraction of Zinc (Zn) is added into the raw material as alloying element. Further, the developed Aluminum alloys is used again as matrix material for the fabrication of composites (AAMCs) by adding different weight fraction of Silicon Carbide (SiC) as reinforcement material. The both alloys and composite materials are fabricated through stir casting process by Stir Casting Machine (SwamEquip; SCM-Al01) and further studied through X-ray diffractometer and scanning electron microscope for their physical characterizations. Microstructures of fabricated Aluminium alloys and AAMCs are observed in an inverted metallurgical microscope and grain sizes are measured by following the ASTM standard. Hardness test of the fabricated Aluminium alloys and AAMCs are carried out by Vickers Micro-hardness testers (BHT-1000) and hardness values were measured by the integrated software, VIDAS 2.0. It is observed that equiaxed grain structures are developed for both the fabricated Aluminium alloys and AAMCs. It is also interestingly observed that micro-hardness of Aluminium alloys and AAMCs increases with increase in the wt.% fraction of Zinc irrespective of weight fraction of reinforcement material. It is also observed that micro-hardness of AAMCs increases with increase in weight fraction of Silicon Carbide irrespective of weight fraction of Zinc.

Design and Analysis of Automatic Loading and Unloading of Casting after Fettling Process

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There are approximately 5000 foundries in India, which are largely in the Micro, Small, and Medium Enterprises (MSME) sector, located in various foundry clusters. 7Every year India produces more than 11 million metric tons of cast products and India is the 2nd largest country in the world to produce cast products. Nearby 70% of foundries are still not adopting industry automation for several reasons, so automation in the casting process is the need of the hour today to produce precision and quality products to meet the world market demand. TATA Technologies Limited and MSME, Belagavi, Karnataka, India jointly initiated a sponsored program in collaboration with industry

and academia to overcome the challenges to implement automation in foundry industries and promote the adoption of Industry 4.0. The objective of this project is to provide an automation solution to one of re known foundry in Belagavi, Karnataka, India for cast products. Generally, the fettling process is carried manually involving large number of labors and time consuming. In our research, after the fettling process planned to design customized automated guided vehicles (GAV) to improve transportation of heavy cast products to different finishing machines. It reduces the labor fatigue while handling heavy cast product and redesigning the floor layout of finishing section to increase the productivity. A detailed comparison of the present status of the production system and automated production system concerning to mode of the transport system to various finishing machines. The number of laborers involved, and the operating cost at the finishing section are discussed in this project.

Various Curve Geometries to Improve Bending Strength of Involute Tooth Profile of Spur Gear

Amol Vikas Joshi (GHRCE Nagpur)*; Santosh Jaju (G H Raisoni College of Engineering Nagpur)

Power transmission from one axis to another axis with portable nature, requires gear. In operation involute tooth reported as bending and pitting failure. Bending fatigue causes gear tooth cracks at the root and pitting causes more wear. This bending failure reduced with the help of selection of materials, geometric modifications like changes in shape of profile, transmission error, module, tip relief, pressure angles and with application of forces. Geometric shapes of profiles plays a vital role for improving bending strength. A normal force acting on gear tooth get resolve in three component like tangential, radial and axial. There are four types of geometric shapes of profile available such as Trochoidal, Circular, Bezier, Cubic spine to modify gear geometries to reduce stress with the help of hob cutter. This paper focuses on identifying a best method for modification of involute tooth of gear for strengthening the bending resistance of the spur gear.

A Review on Industrial Artificial Intelligence in Industry 4.0

Niranjan Pattar (KLE Technological University Belagavi Campus)*; Subhas Patil (KLE Technological University Belagavi Campus); Ravishankar Chikkangoudar (KLE Technological University Belagavi Campus); Nagaraj Kelageri (KLE Technological University Belagavi Campus)

This paper aims to conduct a systematic review of current trends in Industrial Artificial Intelligence and its application in real manufacturing environments. The focus is on identifying the key enabling technologies and core design principles associated with the integration of AI in the context of Industry 4.0. Additionally, the paper formulates a set of challenges and opportunities that need to be addressed through future research efforts, along with proposing a conceptual framework to bridge the gap between research in this field and practical implementation in the manufacturing industry. The ultimate goal is to promote the adoption of AI in manufacturing by facilitating a successful transition toward a digitized and data-driven company culture. By providing a comprehensive definition and a holistic view of Industrial Artificial Intelligence within the Industry 4.0 landscape, this paper identifies and analyzes the fundamental building blocks and ongoing trends. The insights and findings are expected to benefit researchers and manufacturers by enhancing their understanding of the requirements and necessary steps for a successful Industry 4.0 transformation empowered by AI, while also highlighting the challenges that may arise during the process.

Fabrication and Tribological Characterization of Hybrid Metal Matrix Composite (AA2024/SiC/CNT) for Aerospace and Automotive Applications

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This study focuses on the fabrication and characterization of a hybrid metal matrix composite (MMCs) consisting of AA2024 as the matrix and SiC and CNT as reinforcements. The composite was manufactured using the liquid stir casting method with various weight percentages of reinforcements. The tribological properties and microstructure of the fabricated specimens were investigated to assess their suitability for applications in the aerospace and automotive industries. The linear reciprocating wear analysis was performed to determine the frictional force, coefficient of friction, and wear rate. Among all the samples, the composition AA2024-0.25%SiC-0.75%CNT exhibited the lowest wear rate, with values of 2.222 x10-6g/Nm, 2.083 x10-6g/Nm, and 1.3168x10-6g/Nm at loads of 5N, 10N, and 15N, respectively. Microstructural characterization was conducted to examine the fabricated composite's microstructure. The findings of this study provide valuable insights into the development of high-performance metal matrix composites for demanding aerospace and automotive applications.

Discussions On Application Of Differential Quadrature Method For Structural Free Vibration Problems

Mukund Arun Patil (G H Raisoni Institute of Engineering & Business Management, Jalgaon)*; Suvarna Saraf (G H Raisoni Institute of Engineering & Business Management Jalgaon); Ravikiran Kadoli (National Institute of Technology Karnataka Surathkal, Mangalore)

A comprehensive review of the differential quadrature method's use has been provided, including a discussion of the weighting coefficient, multiple approaches to apply the boundary conditions, and eventual benefits over other numerical techniques. The authors have described the technical procedures such as discretization of the computational domain, creation of mass, damping, and stiffness matrices, and partition of these matrices into sub matrices. Exemplifications have been provided for the differential quadrature (DQ) techniques that satisfy the clamped-spring support boundary constraint. This study on the fundamentals of the differential quadrature method will be beneficial to a research scholar or early-stage researcher and academician in the computing realm.

A Classical Review on 3D Printing Materials

Kiran B M (Pandit Deendayal Energy University)*

3D Printing is a manufacturing process used to make 3D components layer by layer instead of conventional machining, which is subtractive. In traditional machining, unwanted materials are removed from the work material as chips while shaping a 3D component. However, traditional machining is fast and accurate regarding component production, resulting in lots of material waste as chips. Also, conventional machining is unsuitable for machining hard and complicated aerospace components, such as components made of titanium alloys.

A Novel Inspection Technique for Printed Circuit Boards

Kiran B M (Pandit Deendayal Energy University)*

Many electronic products, such as washing machines, dryers, air conditioners, refrigerators, vacuum cleaners, electronic printers, electric trains, automatic dispensers for hot and cold drinks, medical equipment for cardiology and dialysis, etc., will use printed circuit boards (PCBs). Thus PCBs are very important components in electronic

products. This scenario has made many manufacturers strive to produce such PCBs in large numbers. Researchers have proposed methods to inspect such PCBs in the last two decades. PCB manufacturing may involve more than 50 operations. Many times, operators use their judgment in performing PCB inspection. Many of these judgments are slow, subjective, and error-prone. This highlights the importance of an automated inspection system.

Green synthesis of Copper Oxide nanoparticles from Curry leaves extract for photocatalytic degradation of Methylene Blue under ultraviolet light

Shivani Gupta (Shobhit Institute of Engineering & Technology)*; Himanshu Narayan (Usha Martin University); Rakesh Kumar Jain (Shobhit Institute of Engineering & Technology, Meerut)

Copper oxide nanoparticles (NPs) with an average particle size of 20 nm, were synthesized from Curry leaves extract through a simple green method. The photocatalytic properties of the samples were studied for the degradation of Methylene Blue (MB) dye under ultraviolet light. The degradation after 180 min was found to be nearly 65 %, at a rate of degradation 5.01×10 -3 min -1. The observed degradation can be attributed to the process of photosensitization. It was concluded that the Curry leaves extract act as an excellent reducing as well as a capping agent and thus supports the synthesis of NPs.

Study on Seismic Performance of Reinforced Concrete High-Rise Building with Buckling Restrained Braces Dissipation Devices

Ravi Kant (Shoolini University)*

Performance-based Seismic Engineering is the modem approach to Earthquake Resistant Design to control lateral deflection and inter-story drifts. It is a significant challenge to overcome in the execution of high-rise buildings. Since structures are subjected to lateral loads, the Utilization of dissipation devices such as the bracing, shear wall, and dampers are a possible method to enhance the structural performance of the high-rise building under load cases. These cases are varying to static and dynamic ones as Response Spectrum. Properly designed and detailed structures with dissipation devices have exhibited excellent performance during a severe earthquake. Lateral forces due to will be resisted in its plane. In continuation studies of reinforced concrete structure compared to the absorbing devices, Three essential reinforced concrete buildings were taken for analysis G+ 30 floors to cover the broader spectrum of high-rise building construction. Software ETABS carried out seismic analysis through Response Spectrum Analysis. The result highlights how structural damper systems perform much better than other systems with accuracy and exactness through the parameters of Displacement, Drift, Base shear, and Stiffness. Damper structures are more suitable for high-rise buildings and earthquake zones due to this study's results; maximum height of systems could be possible, which must be economically less expensive than steel structure of the same height.

Usage of Artificial Neural Network and Quantum-inspired Evolutionary Algorithm for optimization of the wire EDM cutting of mild steel

"Shivam Varma (National Institute of Advanced Manufacturing Technology); Abhishek Pandey (ABES Engineering College, Ghaziabad); Rajesh P. Verma (Graphic Era deemed to be University); Akashdeep Negi (Graphic Era to be Deemed)*; Niithin Kumar (Graphic Era deemed to be University)"

In the current study, the impact of mild steel kerf width, material removal rate (MRR), and surface roughness of wire Electrical Discharge Machining (EDM) cutting process parameters are examined. This process is modelled using an ANN, and correlations between the process variables, as well as responses are created. On kerf width and MRR, a little impact of pulse-on time and gap voltage is discovered. However, the kerf width and MRR are getting smaller as the pulse-off time increases. With a rise in wire feed rate, it is discovered that kerf width and MRR increase. By the rise in wire feed rate, GV, and TON duration, the surface roughness also increases. An inverse relation is found between pulse-off time and surface roughness. Quantum-inspired Evolutionary Algorithm (QEA) is applied to optimize the process in MATLAB software. The optimum range of TON, TOFF, WF, and GV were found 25-27 µs, 25-26 µs, 5-6 mm/min and 63-65 Volt respectively considering the machine constraints.

Optimization of CNC Turning Parameters for AA7075/SiCp Composites with Response Surface Methodology

Girimurugan R Ramasamy (NANDHA COLLEGE OF TECHNOLOGY)*; P Thangavel (Shree Venkateshwara Hi-Tech Engineering College); K M Arunraja (Shree Venkateshwara Hi-Tech Engineering College); S Prakasam (Shree Venkateshwara Hi-Tech Engineering College); Lingeswaran P (Shree Venkateshwara HiTech Engineering College)

In this investigation, a computer numerically controlled lathe and Tungsten Carbide inserts was used to examine how easily a metal matrix composite cast from aluminium could be machined. Many other permutations of processing factors, like cutting temperature, vibration, and surface roughness, machining Parameters like machining velocity (Vc), feed (f), depth of cut (ap) have been tried in an effort to achieve optimal machinability. Using a response surface methodology, it was able to empirically discover correlations between the desired characteristics and the impacts of interaction between the selected factors. Composite adhesion on the inserts and abrasive wear on the rack face were discovered to be the root causes of the poor surface quality. It was discovered that the abrasive chip generated by milling Aluminum-SiC Metal Matrix Composites (MMC) led to notching wear. Confirmation tests verify the accuracy of the empirical relationships that have been developed, and it is concluded that the RSM method used is not only a powerful instrument for creating these links, but also a useful method for visualizing the required performance metrics."

Multiobjective optimization on the machining parameters of AA2024/TiC metal matrix composites using electrical discharge machining process

Girimurugan R Ramasamy (NANDHA COLLEGE OF TECHNOLOGY)*; P Thangavel (Shree Venkateshwara Hi-Tech Engineering College); S Prakasam (Shree Venkateshwara Hi-Tech Engineering College); K M Arunraja (Shree Venkateshwara Hi-Tech Engineering College); S Meinathan (Shree Venkateshwara Hi-Tech Engineering College)

The aim of this research is to prepare a metal matrix composite (MMC) using aluminium and the stir casting technique. The machining properties of the produced composite sample are investigated using electrical discharge machining (EDM) on a die sink. High-strength materials including alloys, composites, and functionally graded materials all benefit from EDM's ability to generate deep holes and complex forms. In this analysis, AA2024 is used as the matrix material, while titanium carbide (TiC) powder makes up 5 % of the MMC's strengthening component. Changing machining inputs like peak current (Ip), Gap voltage (Vg), pulse on time (Ton), and flushing pressure(P) can affect the Material Removal Rate (MRR), the Tool Wear Rate (TWR), and the Surface Roughness (SR).

Optimization on the process parameters of AA2519 and AA6063 joints by Friction Stir and Tungsten Inert Gas process welding using Response Surface Methodology

GIRIMURUGAN R RAMASAMY (NANDHA COLLEGE OF TECHNOLOGY)*; P Thangavel (Shree Venkateshwara Hi-Tech Engineering College); S Prakasam (Shree Venkateshwara Hi-Tech Engineering College); K M Arunraja (Shree Venkateshwara Hi-Tech Engineering College); K Kannakumar (Shree Venkateshwara Hi-Tech Engineering College)

In this research, Tensile strength (TS), percentage elongation (EL) and micro-hardness (HV) at a Tungsten Inert Gas and Friction Stir Processing (TIG+FSP) welded connection of AA2519 and AA6063 were all predicted using empirical relationships with a 95% level of confidence. The models generated highlight the importance of the tool's rotating speed and tilt angle. During TIG+FSP welding, the heat input to the joint increases as the traverse speed slows and the tool rotational speed rises. Faster tool rotation, as shown by the confidence interval, increases tensile strength and hardness while decreasing residual stress. With a tool rotational of 1500 rpm, a traversal speed of 40 mm/min, and a tilt angle of 1°, the nugget zone (NZ) of a TIG+FSP weldment had the lowest compressive residual stress (21.1 MPa). Hardness(110 HV) was also good (58 HRC) and tensile strength (270 MPa) was strong. Input processing factors tool rotational speed (A), traverse speed (B), and tilt angle (C) are best set at 1130.62 rpm, 52.49 mm/min, and 0.16350 respectively, leading to optimal values of 221.4 MPa for tensile strength, 24.72 percent for EL, HV at the NZ, and 91.47HV for residual stress at the NZ.

Mechanical Enhanced Involuntary Stress-Strain Characteristics and Environmental Assessment: GGBS & Silica-Fume

PV Ramana (MNIT)*; Anamika Agni (MNIT Jaipur)

This paper comprehensively investigates the mechanical properties, stress-strain behavior, and environmental impacts of normal concrete (NC) blended with ground granulated blast furnace slag (GGBS) and silica fume. The study explores NC's fresh and hardened properties through compression tests on 150x150x150 mm cubes and stress-strain behavior analysis using 150x300 mm cylindrical specimens. The ductility factor for various combinations of GGBS and silica fume is determined using the Saenz Model, and the normalized stress versus normalized strain graphs are presented. Additionally, the paper examines the effects of using pozzolanic materials, such as silica fume and silica fume, as cement replacements in high-strength concrete, including their impact on environmental indices. Seven mix designs are employed, and parameters such as compressive capacity, toughness, strain at peak stress, relative energy absorption, and stress-strain relationship are evaluated. The findings reveal optimal weight percentages of 15% silica fume and 5% silica fume as replacements for cement, resulting in enhanced performance of NC under compression. The proposed empirical formulations for the compressive performance of NC align well with the experimental results. However, including 15% silica fume in the concrete leads to more significant environmental damage, as the evaluated indices indicate. Nevertheless, the NC without pozzolans demonstrates a lower environmental index, except for climate change.

Free Vibration Analysis of a Functionally Graded Plate us-ing Layer-wise Higher Order Theory

Vikram Parmar (IITD)*

In this work the free vibration analysis of the two different Functionally Graded Material (FGM) Al/Al2O3 plate has been carried out using finite element method (FEM) based on the kinematics of layer wise higher order theory. The material properties of the plates are assumed to vary uninterruptedly across the layer according to a power-law distribution of the volume fractions of the plate constituents. The power law index has been varied and seven indices have been considered varying from (n = 0.1 to 10) for defining the layer wise properties of FGM plates. The mesh convergence analysis has been carried out and the results obtained have been validated with those obtained employing commercially available FE software ABAQUS and results existing in the literature. A detailed parametric analysis has been carried out to investigate the influence of boundary conditions, geometric parameters (aspect ratio and thickness ratio), power law exponent and material properties on the free vibration response of FGM plate. The boundary condition considered in the analysis are all edges clamped (CCCC), all edges simply supported (SSSS) and a combination of clamped, simply supported, and free edges (SFSF, CSCS, CFFF and CFCF).

Effect of process parameters on free-form magnetic abrasive finishing of bearing material

Nanji Chaudhary (Gujarat Technological university)*

Free-form magnetic abrasive finishing (FFMAF) is an emerging finishing process that utilizes magnetic fields as cutting force and abrasive particles as a tool on free-form surfaces, resulting in efficient and precise finishing. This paper presents the development of the FFMAF setup and an experimental investigation of the effect of process parameters on the surface roughness in the FFMAF process for finishing bearing races. The process parameters that were varied during the experiments were the working gap, rotational speed, feed rate, % weight of abrasives, and MAP sizes of the workpiece. The results of the experiments showed that the surface roughness decreased with an increase in the magnetic field strength, rotational speed, and percentage weight of abrasives, while it increased with an increase in the feed rate MAP size. The findings of the study can be used to optimize the FFMAF process parameters for finishing bearing races in various industrial applications.

Damage Assessment Of Corroded Rcc Flexural Members- An Experimental Study

Komera Sai Tejasvi (CVR College of Engineering)*; Manoj Tangudu (CVR College of Engineering)

Concrete has been a vital component of building for centuries and is used more frequently than any other man-made material. Concrete is brittle in nature; addition of steel reinforcement strengthens it. However, structures still fail for other reasons, such as corrosion of the steel reinforcement. An electrochemical reaction between the steel and its surroundings causes the reinforcing metallic bars in concrete members to corrode, which weakens the link between the metal and the concrete. As a result, the connection between the steel reinforcing bar and concrete becomes less strong, decreasing the building's strength. An effort has been made in this study to identify and quantify the impact of reinforcement corrosion on the flexural performance of reinforced concrete beams. The reinforced concrete specimens are corroded using the accelerated corrosion process employing Impressed Current technique inducing an average current of 1 amp. The flexural behavior of reinforced cement concrete (RCC) beams at 0%, 5% and 10% corrosion levels were studied using conventional LVDTs, dial gauges and developed load-deflection, stress-strain, and moment-curvature curves. The study also incorporates the effect of Pre-crack employed on the uncorroded specimen to accelerate the corrosion by applying 50 to 60 percent of the ultimate load.

Live Telecasting Robo using Arduino Uno

Dommeti Durga Prasad (Vishnu Institute of Technology)*

A remote-operated robot is a wheeled device that can be controlled from a distance, enabling users to navigate and interact with their environment through its wireless internet connectivity. Usually, the robot utilizes a tablet or smartphone to offer video and audio functionalities, as well as to provide a visual representation of remote locations. Our paper combines a smartphone that creates a virtual reality experience through its screen and a quadrupedal robotic vehicle. The vehicle can be controlled using an Arduino Bluetooth app, allowing users to maneuver and interact with their virtual environment. The camera movement is controlled by servo motor and data pro-cessed by the Arduino board. Specified link is generated by Arduino and by using this link a video is received by the smartphone. Using an Arduino, a camera placed at a distant location is used to visually record the environment. These images are accessible on our devices. Additionally, the newly added capability gives customers a real-time experience by allowing the camera to move in the same direction as their phones. In indoor environments like hospitals and muse-ums, the cost-effective telepresence robotic platform with Arduino and suggestive feedback and real-time feeling for the user offers complete and immersive remote operation. Using remote connectivity to make live feeds accessible in dangerous locations like conflict hotspots, dusty regions, nuclear explosion zones, or industrial hazardous zones. Our project addresses the challenge of immersion in Telepresence Robotic systems by integrating Virtual Reality headsets, such as Google Cardboard. This allows users to have a more immersive experience while remotely controlling the robot. We have also implemented online real-time head movement control, enabling natural head movements to be reflected in the remote environment. By combining these features with traditional telepresence platforms, controlled remotely and wirelessly via the Internet.

Mechanical Properties and Micro-Structural Study of Pre-Treated Crumb Rubber Concrete

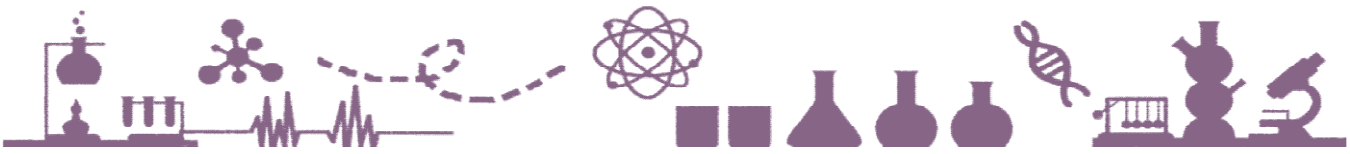
Rajagopal R Madabushi (CVR College of Engineering)*; G Anurag (CVR College of Engineering)

Non-biodegradable tyres that have been dumped endanger the environment. Due to the scarcity of landfills and the health dangers they pose, waste rubber from tyres is a significant problem on a global scale. Large-scale recycling of used tyre rubber waste not only benefits the environment, but it also results in a new variety of concrete with specific mechanical and fracture properties. In this study, the author will examine the impact of the pre-treatment technique and admixture on the mechanical and microstructural analyses of crumb rubber concrete. Crumb rubber (5%, 10%, 15%, and 20%) replaces natural fine aggregate in this project's volume. In order to conduct this investigation, samples of the M20 and M30 concrete grades were cast, allowed to cure, and then evaluated on day 28 for varied proportions. The crumb rubber is pre-treated with NaOH and combined with micro-silica to increase its strength and durability. Workability tests, fineness tests, setting time tests, consistency tests, compressive strength tests, split tensile strength tests, and micro structural investigations were all conducted in the lab. In comparison to crumb rubber concrete with 0% replacement rubber, untreated crumb rubber concrete, and crumb rubber concrete that had been treated with NaOH, adding Micro silica as an additive improved workability and strength. The macro level experimental compressive strength results were validated using the predictive models available in the literature on CRC and also correlated with micro-structural level analysis and the findings reported.

Design and Performance Analysis 11-T SRAM Cell with BTI Reliability

G Prasanna Kumar (Vishnu Institute of Technology)*

The standard 6T SRAM cell stability decreases due to diminished size. The chal-lenges in 6T SRAM is power consumption high, more delay and noise margin in static state low package density. Moreover, Because of voltage division between the access and pull-down transistors in the inverter, which the 6T cell grows more susceptible to



noise from the outside. Due to external noise, the stored data can be easily destroyed. Hence a different topology has been introduced that con-sists of 11 transistors which improves the read and write stability by employing separate current paths for operations read and write. The 11-T cell can be used at low supply voltages but the write operation is similar to 6T cell and the major disadvantage is its read/write access delay and more area. To improve the write operation of SRAM cell and to overcome the limitations of the 11-T cell, two 11-T SRAM topologies are being implemented; one with supply-cut-off and other one with ground-cut-off. As the distance between the transistors decreases the cell may suffer from multi-bit soft error/upset which can be avoided by using Bit Interleaving Architecture This is limited to cells that operate completely half select (HS) free. The row and column signals are regulated by write operation and tran-sistors. Because of this cross- point cell selection, the write operation is improved by using power-cut-off write assist. Due to aging effect, the threshold value of the transistors may vary and degrade the performance. The major reliability issue in this is Bit Temperature Instability (BTI). The effect of BTI in MOS transistors can be reduced by improving the threshold voltage. The 11-T SRAM cells being implemented will improve write/read margin, reduces the leakage power, increas-es speed, decreases write/read power. The results are being compared with 6T and conventional 11-T SRAM cells.

Experimental Investigation of mechanical properties of fiber reinforced cenosphere lightweight concrete with higher temperature effect

Nilesh Suresh Zanjad (Government Polytechnic)*; Shantanu Pawar (G H Raisoni University Amravati); Chittaranjan Nayak (Vidya Pratishthan's Kamalnayan Bajaj Institute of Engineering and Technology, Baramati)

The aim of this research is to explore the impact of polypropylene fibers and glass fibers on the mechanical characteristics of lightweight concrete when subjected to elevated temperatures. Different fiber ratios ranging from 0.25% & 0.50% by volume of concrete were tested to evaluate their impact on various concrete mixtures. Cenosphere is lightweight material as used with cement as bonding material. Pumice aggregate, which is known for its lightweight properties, was utilized as the coarse aggregate. The study aimed to explore various characteristics of lightweight concrete such as slump value, unit weight, and compressive, tensile, and flexural strength. The concrete samples were subjected to different temperatures ranging from 200°C to 400°C for two hours. The findings revealed that the addition of glass fibers improved the tensile strength of the concrete and enhanced the compressive and flexural strength of the lightweight concrete. However, the incorporation of polypropylene fibers resulted in more cracks and pore formation in the concrete. Additionally, the compressive and flexural strength of the concrete decreased with an increase in temperature up to 400°C.

Investigation of Heat Exchanger effectiveness using Solar Water Heater

Apurv Yadav (Amity University Dubai)*; Wellington Katsenga (Amity University Dubai); Hardeep Kumar (Amity University)

Water heating has many applications in current scenario. However, this process consumes a lot of power. Solar water heaters (SWH) are most promising solution for this. The effective application of SWH systems are dependent upon the heat exchanger systems used between SWH and final load. Heat exchangers can be majorly classified based on direction of flow from hot and cold source; namely, parallel flow or counter flow. In this work the application of SWH is tested with both these type of heat exchangers. The effectiveness value of the counter flow heat exchanging system was found to be 11% higher than the parallel flow system. The amount of heat transfer of counter flow system was also 4.3% higher per second than the parallel flow.

Design of Mobile application controlled Photovoltaic Seed Sowing and Drilling Machine

Mohamed Husam (Amity University Dubai); Razik Akbar (Amity University Dubai); Isaac Devabalan (Amity University Dubai); Apurv Yadav (Amity University Dubai)*

With the ascending number of population, there is an increase in demand for crop production. Conventional ways of plowing, digging, and sowing the seeds are still being used by the majority of the farmers in the developing or underdeveloped countries. The equipment for these purposes is being driven by tractors that run on non-renewable means of energy. A solar powered bot is designed and fabricated to carry out soil digging and seed sowing. An application designed to work on any android device is used to connect to the Bluetooth module fixed onto the system. Two motors drive this bot having a total approximate weight of 30 kg. With the use of a 40 Watt panel and a 55Ah battery, the whole system can run for nearly two hours.

Thermal property and lattice thermal conductivity analysis of dual filled skutterudites LaxNdyCo4Sb12

Yuttana Mona (Chiang Mai University)*

CoSb3-based skutterudite-type thermoelectric materials have garnered significant attention for energy applications. These binary compounds exhibit desirable properties, such as high carrier mobility and large Seebeck coefficients, which are essential for thermoelectric materials. However, the thermal conductivity of these materials remains a major obstacle in improving their overall efficiency. The introduction of guest ions into the vacancy sites of the skutterudite lattice has shown potential in reducing the thermal conductivity of the lattice without compromising the Seebeck coefficient and electrical conductivity. The presence of guest ions within the crystal lattice induces a rattling effect, resulting in a significant reduction in thermal conductivity. Single filled skutterudite can significantly reduce lattice thermal conductivity. However, the difference in mass and size of the filler ions has been found to boost the rattling effect, thereby resulting in stronger phonon scattering with difference filling species. Therefore, in this study, we have attempted to synthesize double-filled LaxNdyCo4Sb12 compounds and investigate their thermal conductivity and lattice thermal conductivity with varying filling rates.

A Comparative Analysis of Diabetes Management System Using Various Nanotechnology

Sivaraman M (Dr.SNS RAJALAKSHMI COLLEGE OF ARTS AND SCIENCE)*

Nanotechnology represents a multidisciplinary discipline with a wide range of uses that are being developed to enhance people's standard of lifestyle. Nanomedicine is a subspecialty of medicine that uses nanotechnology principles to prevent, diagnose, and cure diseases such as heart disease, cancer, and diabetes. The development of diabetes is regarded as one of the primary maladies of modern level society. The most typical treatment for this illness is alternative insulin therapy, which includes doses of insulin with a long half-life at mealtimes. In diabetic patients' daily lives, injections of insulin and tests for glucose can be nervous and time delay. Many efforts are made to alleviate some of the drawbacks of injectable treatment, but new safe and cost-effective methods for diagnosis as well as therapy are required. Nanotechnology is becoming increasingly important in diabetes research. Nanotechnology-based testing may gives more perfect information for diabetes mellitus diagnosis. Based on nanotechnology, different therapeutic techniques for non-invasive blood glucose monitoring have been developed. Some notable accomplishments include molecular diagnostics of diabetes, oral insulin delivery using nanospheres as biodegradable polymers carriers, and the construction of artificial pancreas and artificial beta cells. The purpose of

this review is to shed light on the possibilities of nanotechnology in mellitus treatment and diagnosis, as well as to discuss the prospects for the future.

Experimental estimation of shear strength and inter laminar toughness of interface of Al and CFRP Panel R

SRI LAKSHMI (sardar vallabhbhai national institute of Technology)*; Naveen Kurri (Sardar vallabhbhai national institute of technology)

Joining of aircraft thin panels can be done in two ways, firstly, bolted or riveted mechanical fasteners and secondly, adhesive bonding. Bolted joint panels are easy to fabricate with less setting up time. The greatest advantage of this bolted joint fastening technology is that it can be sequentially disassembled at any time based on the requirement. However, there is a lot of disadvantages in bolted joint assembly of thin sheets as compared to adhesive bonding. One of the disadvantages is the bonding of thin panels using mechanical fasteners with many small fasteners which put in cost and weight. The adhesively bonded joint is usually more structurally capable than a mechanically fastened joint. However, a bonded joint can transfer load evenly across its interface area. Therefore, adhesively bonded joints began to come into view as a feasible choice to mechanically fastened joints. If designed properly bonded joints take complete gain of this capability to progressively react load from one component to another ensuing in thinner and hence lighter components. In this work, experimental characterization of the lap shear strength of Aluminium(Al) - Al alloy, Carbon fiber reinforced polymer (CFRP) - CFRP, and Al – CFRP is estimated. CFRP panel is fabricated using a hand lay-up process. All material properties of the CFRP panel are evaluated as per the ASTM standards. Here, two types of adhesives are chosen: brittle adhesives such as AV138/HV998 and intermediate adhesives such as Araldite 2014. Further, the interfacial fracture toughness (GIc) of the bonded joint is an important property, so it is estimated by conducting a tension test with double cantilever beam (DCB) specimens made of Aluminium(Al) - Al alloy, Carbon fiber reinforced polymer (CFRP) - CFRP and Al – CFRP is estimated.

Performance evaluation of a thermal mug integrated with Lauric acid - graphite based PCM nanocomposite for enhanced thermal properties

Asha A Madhavan (Amity University)*

Development of nano-dimensional smart materials to meet the present-day mounting demands of energy has become the new frontier in the field of research due to the rapidly dwindling perishable forms of conventional energy source. Thermal energy as per eminent surveys conducted by global researchers has been the most abundant, crucial and underutilized. In efforts to contribute to the shift towards using sustainable materials, current research work is targeted to improve the stability and thermal properties of phase change materials (PCM) which are considered thermally smart materials due to their fascinating ability to absorb, store and release thermal energy in the form of latent heat. In the present study aluminium oxide nanoparticle synthesized by molten salt method was amalgamated with lauric acid (PCMC). To enhance thermal properties of Lauric acid, different wt% (0, 0.25, 0.50, 0.75 & 1.0) of graphite (NG –PCMC) was dispersed by melting and mixing method. The best performing PCM nanocomposite after stabilization was incorporated into the thermal Mug. Thermal studies conducted thermal mug confirmed that the upper limit of the optimal range of consumption attained with NG-PCMC within 16 minutes due to the high heat transfer rates and retained the heat for 10 minutes longer than control (PCMC) within the optimum

temperature range. Hence herein we report successful fabrication of NG-PCMC based thermal mug which can aid in healthy and conscious consumption of hot beverages at temperatures suitable for the tissues of esophagus.

A review on the synthesis and applications of Polyhydroxyalkanoates (PHA): An environmentally benign alternative to petrochemical-based polymers

Abhinav Kumar Singh (Indian Institute of Technology Roorkee)*; SACHIN KUMAR (Indian Institute of Technology Roorkee); GAURAV MANIK (Indian Institute of Technology Roorkee)

The environment-friendly substitutes for conventional petrochemical-based polymers have become necessary for environmental sustainability. Polyhydroxyalkanoates (PHA) are emerging as an alternative to traditional petroleum-based plastics. PHA has enormous potential to overcome the problems caused by petrochemical-based polymers. PHA's ability to biodegrade in ambient conditions emphasizes its benefits to the environment. PHAs also have adaptable material characteristics, making them the perfect choice for various applications, such as packaging materials, agricultural films, medical equipment, and consumer items. Several methods are used to produce PHAs, including mixed microbial consortia, bacterial fermentation, and renewable carbon sources that create biopolymer PHAs. The main challenge is the route of PHA development and their extraction method. The obtained properties of PHAs may significantly vary according to the method used. So, finding the most suitable and economical process for mass-level production of PHAs with the most valuable properties is essential. With this perspective, this paper elaborates on the difficulties in producing PHA, such as establishing cost competitiveness and maximizing PHA polymer output and quality. Additionally, PHA's environmental impact assessment during its life cycle offers positive results compared to standard polymers, showing lower greenhouse gas emissions, decreased use of fossil fuels, and less trash formation. Progressive research is required to enhance the total life cycle of PHA and its scalability. The current review presents the potential alternative for developing PHA through different processes and their applications for replacing synthetic polymers.

Development of Macroscopic Hydraulic Conductivity Model in Coarse Grained Soil from Physical and Material properties

B. Naga Malleswara RAO (CVR COLLEGE OF ENGINEERING)*

Soil hydraulic characteristics impact the process of water and salt movement in the soil system and this study is related to many important fields like aquifer recharge, contaminant transport, sub-surface moisture dynamics, infiltration and rainfall runoff relation, slope stability, surface water and ground water interactions and water management in agriculture among others. The methods used to model water flow, compaction, and consolidation in sandy soils are therefore substantially compromised by this failure to take the impacts of adsorbed water layers into account in the formula to estimate hydraulic conductivity. Similarly, with inadequate prediction of the hydraulic coefficient for sandy soils, seepage through embankments and landfills are either underestimated or overestimated. Similarly, with increasing focus on the ground water contamination due to leaching from landfills. Hence, a study is conducted to determine the relationship between adsorbed water layers in soils and the macro scale variables utilised to estimate saturated hydraulic conductivity and effective porosity. This will make it easier to anticipate the saturated hydraulic conductivity and effective porosity of sandy impacted soils. As a function of permeability and pore-water chemistry, the functional relationship and physical characteristics of soil, electro-chemical characteristics of pore water, and effective porosity will be formed. Measurement and assessment of soil physical parameters, such as specific gravity, porosity, and saturated hydraulic conductivity, will be done utilising constant head permeability

tests. The final framework will be done to establish the relation between soil parameters to incorporate the effects of adsorbed water with 1 M Sodium Chloride and 1 M Calcium Chloride.

Different Techniques For Calculation Of Blast Pressure

Shanila Qureshi (Shri Ramdeobaba College Of Engg & Management)*; Dr. Prabodh Pachpor (Shri Ramdeobaba College Of Engg & Management)

The accurate estimation of blast pressure is of paramount importance in safeguarding the structural integrity and ensuring the resilience of buildings subjected to explosive events. This paper presents a comprehensive investigation into blast pressure calculation techniques, with a specific focus on utilizing the well-established TM5-1300 manual and IS 4991:1968 standards. The study considers a critical scenario involving a 100kg TNT explosion occurring at a distance of 15m from a front wall building with a G+4 structure and a height of 20m. Through rigorous analysis and adherence to established standards, our research aims to promote the adoption of best practices in designing blast-resistant structures, ultimately enhancing the safety and security of urban environments

Effect of reaction temperature on reactivity of Titania towards photoelectrochemical water splitting

Anshika Sinha (Centre for Advanced Studies); Maurya Gyanprakash (Centre for Advanced Studies)*; Chandresh Kumar Rastogi (Centre for Advanced Studies)

In this work, we prepared two sets of TiO2 photoanode with hydrothermal method at the sintering temperature 550 oC and 750 oC, respectively. Both photoanode showed different photoelectrochemical reactivity towards the water splitting reaction. The scanning electron microscopy (SEM) analysis for 550 oC sample showed nanoflower-like structure, while 750 oC sample showed nanorod-like structure. The nanorod structure supports the 1-dimensional flow of electron and can enhance the electron-hole separation. Further, the electrochemical analysis showed that the 750 oC sample shows high reactivity compared to 550 oC sample. The open circuit potential (OCP) analysis showed high potential generation in 750 oC sample, which can enhance the reactivity as well as the electron-hole separation. The impedance analysis of both the sample showed the presence and absence of the surface state in 750 oC and 550 oC sample. In 750 oC sample, the presence of the surface state increases the electron-hole separation and reactivity of the catalyst. On the other hand, in 550 oC sample, the excess electron-hole recombination reduces the reactivity of the photoanode. Thus, from the present analysis we conclude that the sintering temperature plays the major role in determining the reactivity of the photoanode towards photoelectrochemical water-splitting.

Analysis On Behaviour Of Rcc Structure Under Corrosion With Respect To Crack

Durga Vara Prasad Bokka (Vishnu Institute of Technology)*

Reinforced concrete remains a widely adopted construction material, owing to its accessibility and adaptability in key structural elements such as beams, columns, slabs, and foundations. However, the corrosion of steel reinforcement within concrete poses a significant risk by weakening the bond strength between the steel and concrete, ultimately compromising the overall strength and durability. This research investigates the impact of chloride-induced corrosion through the use of Half-cell potential, Salt spray, and Weathering techniques on reinforced concrete specimens, which were cast with M20 grade ordinary Portland cement. Additionally, the mechanical properties of the concrete and steel are analyzed through Universal Testing Machine (UTM) assessments of the load and deflection behavior of beam specimens. The experimental results demonstrate a considerable reduction in yield

point and flexural strength, ranging from 10% to 30%, for the corroded bars depending on their diameter. The findings contribute vital insights into the detrimental effects of corrosion on the shear and flexural strengths of reinforced concrete beams, thereby facilitating a comprehensive understanding of the corrosion-induced damage within concrete structures. Furthermore, this research offers guidance for the construction industry to develop effective strategies for corrosion prevention and mitigation, and encourages the exploration of more durable and corrosion-resistant materials and technologies in construction applications.

Numerical Investigation on Effect of Solid-Fluid Interaction Strength on Hydrophobicity of the Curved Surfaces Using Lattice Boltzmann Method

Ganesh Sahadeo Meshram (IIT Kharagpur)*; Gloria Biswal (IIT Kharagpur)

In this study, we present a numerical investigation of the effect of solid-fluid interaction strength on wettability and hydrophobicity of curved surfaces using a two-dimensional (2D) pseudo-potential multiphase lattice Boltzmann method with a D2Q9 model for various solid-fluid interaction strengths of the range varies from -1.25 to -2.50. Initially, simulation of the equilibrium state of a water droplet on a flat surface is considered for various interaction parameters to examine the accuracy of the present numerical model and calculated the contact angle. Contact angles for different values of interaction strength have been validated qualitatively with the previous results. We then imposed the semi-circular concave-shaped surfaces with different radii of curvature. The radii of the curved surfaces are varied from 20 to 50 lu. The wettability of the curved surfaces is simulated with water droplets of radius 100 lattice units in the domain of 200x200 lattice units. The study shows that increasing the solid-fluid interaction parameter of the curved surfaces dramatically increases the contact area between water droplets and solid walls and hence increases the hydrophobicity. The hydrophobicity is analyzed by measuring the contact angle between the solid and fluid-vapor interface. This study also shows the effect of saturation temperature on the hydrophobicity of the surfaces.

Structural Systems and Configuration Of High-Rise Buildings For Lateral Loads

Sameen Farhat Khan (Patankar Consultants Privite Limited)*

In modern world, high rise buildings plays an important role in representing development and potential of any nation but growing population along with insufficient land availability have insisted buildings to extend vertically and therefore high rise buildings plays an essential role especially in metro cities and towns. However as the structure expands in vertical direction it becomes slender and actively responsive to lateral loads. As the height increases the lateral load becomes more dominant than gravity load. The lateral loads are mainly earthquake load and wind load. India is a country where many natural calamities takes place such as earthquake, tsunami, floods, landslides etc. It is not possible every time to predict these calamities accurately but surely we can protect ourselves by strategically designing our structure so that minimal damage is caused. Structural configuration of buildings plays as crucial role in overall strength of a structure. A good configuration with reasonable framing can overcome even poor quality of construction without greatly affecting the ultimate performance of the structure. Decisions made at preliminary stage cannot be modified later therefore it is important to learn about all the consequences that might arrive later in terms of costs, design and performance of building. The initial structural and architectural plans can be in conflicts but it is essential to arrive at mutual compromise at planning stage itself. The behavior of a structure during an earthquake depends largely on the form of the superstructure and on how the earthquake forces are carried to the ground. For this reason the overall form, regular configuration, flow of loads, and the framing system of building may be of

serious concern. In seeking the optimum of the proposed construction, designers should choose forms and materials that give the best failure modes in earthquake within functional and cost requirement.

Studies On Effect Of Laminate Thickness And Hole Diameter Of GFRP/EPOXY Composite Subjected To Open Hole Tensile Test

Hemavathy S (M S Ramaiah Institute of Technology); M Rajesh (M S Ramaiah Institute of Technology); Sunith L Babu (Ramaiah Institute of Technology); Sampath S Arahunashi (M S RAMAIAH INSTITUTE OF TECHNOLOGY)*

The structural parts made from glass fiber reinforcement and epoxy resin composite are widely used in aerospace for manufacturing components such like wings, blades, fuselage and internal parts because of its high strength and light weight ratio. These components need to be joined by different joining process one such process is drilling. Drilling hole in fiber reinforced polymer matrix results in rejection of parts and also affect the performance of composite materials. This study focuses on effect of hole dia and layer thickness of composite laminate namely GFRP and its influence on tensile strength. To study the damage phenomenon, the samples are viewed under SEM to investigate the type of failure. It is noted that with increase in layer thickness the tensile strength decreases while the damage tolerance increases.

The effect of critical factors on green supply chain management implementation in Northern India's Small and Medium-Sized (SMEs) Leather Industries

Arvind Tiwari (Sant Longowal Institute of Engineering and Technology)*

Environmentally friendly supply chain management is concentrated the responsibility of an organisation in appreciating overall ecological consequences of production from the acquisition of raw materials, use of the product, and eventual disposal are all parts of its whole life cycle. This study intends to outline the demands on Northern Indian small- and medium-sized leather industry to adopt green supply chain management. Literature reviews and input from leather industry specialists help outline the factors that facilitate the implementation of green supply chain management. Standard deviation, correlation, and regression analysis were used to examine the quantitative data. The results of this investigation showed that the industries do not plan to green the complete supply chain (SC) system through management commitment, green purchasing and marketing strategies, eco-friendly proposals, or environmental practises. The leather industry has strict environmental policies and protocols, yet despite this, the industry continues to break the law because the relevant bodies have not taken any action. This research paper suggests that the relevant departments create an appropriate monitoring structure and a consolidated green supply chain technique to minimize the issues and encourage balanced economic growth.

Automated Protection Mechanism for Transformer Overloading with Voiceover Alert System

Vijay Raviprabhakaran (CVR College of Engineering, Hyderabad)*; Aparna Ayyagari (CVR College of Engineering, Hyderabad)

This article demonstrates the working of an automated transformer overloading protection mechanism which intimates through a voice-over via Bluetooth to mobile phones. The main aim of this article is to respond to the

faults sooner and report the operator to rectify them. As it's a voice announcement via Bluetooth, it makes the effort of the operator trouble-free. Current sensors detect the faults in the secondary current of the transformer and the audio warning is given through a mobile phone App. This system has a hands-free proclamation which makes the system simple and manageable. When a transformer experiences an overcurrent, the relay keeps tripping until it overcomes the fault. The required action is taken swiftly and perfectly to ensure the full safety of the whole system. The transformer is protected from severe damage and frequent blackouts. Furthermore, this modelled system can be implemented in the power system to avoid uninterrupted supply.

Four-Stroke Internal Combustion Engine Piston Transient State Thermal Analysis

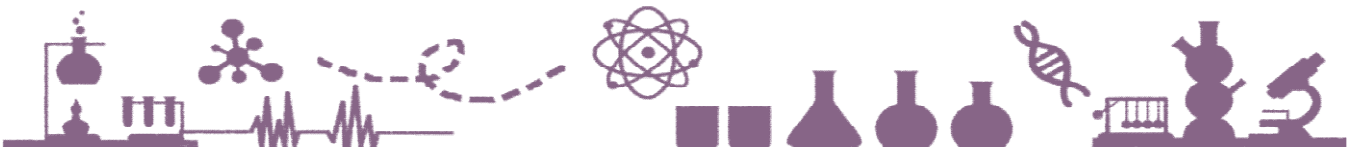
Harshvardhan P Ghongade (brahma valley college of engineering and research institute anjaneri nashik)*; Anjali Bhadre (brahma valley college of engineering and research institute anjaneri nashik

The thermal behavior of pistons constructed of four different materials—Aluminum Alloy, AlSi10Mg, Titanium Alloy (Ti-6Al-4V), and Grey Cast Iron—is compared in this research using the ANSYS program. The objective is to investigate the thermal behavior of pistons constructed from each material under various operating conditions. The primary subjects of the simulations are the temperature distribution and heat flux within the piston for each material, as well as a variety of boundary conditions. Results are presented, contrasted, and their implications for selecting materials for piston applications in internal combustion engines (IC engines) are analyzed. This study demonstrates the capability of ANSYS to simulate and compare the thermal behavior of complex mechanical systems. The thermal behavior of pistons constructed of four different materials—Aluminum Alloy, AlSi10Mg, Titanium Alloy (Ti-6Al-4V), and Grey Cast Iron—is compared in this research using the ANSYS program.

An analysis of drivers affecting the implementation of green supply chain management (GSCM) in leather industries of India

Arvind Tiwari (Department of Mechanical Engineering, Sant Longowal Institute of Engineering and Technology, Sangrur, Punjab, India)*; Arvind Jayant (Indira Gandhi Delhi Technical University, Delhi); Kulwant Singh (Department of Mechanical Engineering, Sant Longowal Institute of Engineering and Technology, Sangrur, Punjab, India)

Due to increasing awareness about environmental conservation and stringent rules and regulations regarding disposal of industrial waste engineers and researchers are striving hard to implement green practices in manufacturing industries. In this research the critical factors known as drivers creating hindrance in order to put green supply chain management into practice .GSCM in manufacturing industries have been identified using various techniques i.e. ISM – DEMATEL and through interaction with industry experts and questionnaire surveys. At present, the drivers of GSCM can prominently play an important role in India because Indian industries are showing growing care for the environment. The primary goal of this research is to identify key drivers that are crucial for GSCM adoption in the leather industry. This research will not only help to reduce/reuse/recycle the waste generated but also conserve energy which is the need of hour. It is further observed that DEMATEL-ISM is an effective and powerful tool for estimating the relevant relationships among various drivers in an uncertain environment. It has been concluded that environmental concern and regulation (D2) is the most influencing driver through DEMATEL technique while ISM technique provides poor organizational culture in implementing GSCM (D12) as the most influencing driver. The information provided in this paper is useful for decision maker in an industry to implement GSCM to enhance the efficiency without polluting the environment.



Investigating the Effects of Carbonated Construction and Demolition Waste with Two Different Granulometries on the Mechanical and Durability Properties of AAC Blocks

Pradyut Anand (Birla Institute of Technology Mesra); Anand Kumar Sinha (Birla Institute of Technology Mesra); Puja Rajhans (Birla Institute of Technology Mesra)*

The aim of this research was to examine the potential utilization of construction and demolition (C&D) waste for the production of autoclaved aerated concrete (AAC) blocks. To enhance the efficacy of the C&D waste, it was treated in a carbonation chamber before incorporation into the AAC blocks. The study utilized two types of C&D waste granulometry: construction and demolition waste coarse or fine i.e., (CDWC) and CDWF respectively. The AAC blocks were produced by using 50% of CDWC/CDWF along with fly ash (FA) and glass powder (GLP), which were used interchangeably in different batches. The study aimed to investigate the effects of the addition of CDWF or CDWC, as a partial replacement of FA, on the mechanical strength and durability resistance of the AAC blocks. The findings of the study revealed that the incorporation of CDWF or CDWC increased the mechanical strength and durability resistance of the AAC blocks. The results suggested that CDWC particles contributed to a more tightly packed AAC block mix, resulting in better particle interlocking and reduced voids, leading to higher flexural strength (FS) values. In contrast, CDWF particles may have contributed to the formation of micro-cracks during the drying process, resulting in decreased FS values. Overall, the study demonstrated that using C&D waste as a substitute for natural aggregates in the production of AAC blocks is a feasible and environmentally friendly approach. The results further indicated that the addition of CDWC and FA resulted in higher strength and durability of the AAC blocks compared to other batches.

Critical Speed of Rotating Shaft in Jatropha Separator Machine for Biodiesel Production: A Finite Element Analysis

Mohd Hafizz Wondi (Universiti Teknoligi MARA)*

Biodiesel production requires the extraction of shell-free kernels from Jatropha fruits in order to increase oil yield and improve oil quality. The husks and shells of the Jatropha fruit can be separated using a machine. Prior to fabricating the Jatropha separator, a failure analysis must be conducted for the critical parts of the machine. This paper analyzes the finite element of the rotating shaft at different disc locations (0.2L, 0.3L, 0.4L, and 0.5L) and diameters (200mm and 300 mm) for the critical speed using Solidworks. The Rayleigh-Ritz method was used to validate the simulation results. The findings reveal that the highest critical speed (3880 rpm) was achieved at a 0.2L disc location. Increasing the shaft diameter from 200 mm to 300 mm increased the critical speed by 56%, from 1660 rpm to 3804 rpm. This study provides useful insights for the design and development of Jatropha fruit separator machines.

Review of Performance of Reflector Materials For Concentrator Solar Technology-Based Dust And Corrosion

Sashank Thapa (Shoolini University)*

Concentrated solar technology is one of the promising technologies. The performance of the technology depends on Direct Normal Irradiance (DNI) and the site weather conditions. The material of the reflector is one of the

important components of the concentrated solar system which reflects the incident solar radiation on the receiver. The efficiency of the system depends on the reflectivity of the reflector. The traditional reflector materials are silver glass with Aluminum, Polymer, and stainless steel. The present study provides a review of the impact of corrosion and dust on the performance of reflector materials and addresses and discusses the new materials applied as reflector material in concentrator solar technology. The novelty of current work is focused on the review of new reflector materials utilized in concentrator solar technology which redefines the future research for other researchers.

Comparative study of design base shear of building Using IS standards and ASCE Standards: Review

Rohit Rahul Shambharkar (G. H. Raisoni College of Engineering Nagpur)*

"Seismic analysis is essential when constructing buildings that are subject to seismic shaking to ensure that the structure is stable and fit for purpose in the event of an earthquake. This process is called seismic design. Every country in the world has its own seismic regulations that must be followed when planning, designing and constructing structures. Seismic standards help minimize loss of life and property and improve the stability of buildings to withstand the effects of earthquakes. The purpose of this study is to determine correlations between parameters like soil type, time period, zone factors, base shear etc. used for designing tall buildings using different international building codes. Two well-known structural codes are used that are Indian Standard (IS1893–2016) and American Standard (ASCE7). Performance of any structure depends on the following criteria: lateral shaking criteria, thermal movement, and interaction between structure and architecture. The primary concern is the stability and reliability of the entire structure and its components, as well as their ability to withstand loads and applied forces. It is convenient to design a building considering earthquake resistance rather than earthquake proof. Of course, the first approach can lead to disaster, and the second approach is too costly. Therefore, the design philosophy should be somewhere between these two extremes.

Seismic Design of G+12 Building Using IS1893

Rohit Rahul Shambharkar (G. H. Raisoni College of Engineering Nagpur)*

When creating structures that may experience seismic shaking, seismic analysis is crucial to ensuring that the building will be stable and functional in the case of an earthquake. When constructing structures, seismic restrictions specific to each nation must be taken into consideration. Seismic standards increase the stability of buildings to withstand the effects of earthquakes and reduce human and natural disaster casualties. The Indian Standard Code IS 1893:2016 governs the seismic design of buildings in India. The code provides guidelines for designing buildings that can withstand earthquakes of various intensities. Here is a summary of the key provisions of the code

Utilisation of PVA Fiber in Study of Reinforced Fiber Concrete Containing Glass Powder

Anil V Shirgire (Dr D Y Patil Institute Of Technology Pimpri Pune)*; Vijay K Javanjal (DIT PIMPRI); Subhash Gadhave (Dr D Y Patil Institute Of Technology Pimpri Pune); Chetan Shashikant Chavan (Dr D Y Patil Institute Of Technology Pimpri Pune); Jagottam agrawal (Dr D Y Patil Institute Of Technology Pimpri Pune); Abhay Shelar (Anantrao Pawar College of Engineering and Research Parvati Pune)

The construction sector is now going through a lot of transformation. A number of materials are being evaluated in order to increase the construction work's standard, strength, quality, and durability. On the basis of this knowledge,

experiments are conducted to increase the strength of concrete. Despite certain modifications in the percentage of M20 Grade concrete, some percentile adjustments have shown considerable differences in the concrete's strength. 15% of the aggregate's total weight has been replaced with glass powder. In order to improve strength and use less water, plasticizer is also used. Numerous tests are used, such as impact testing, water absorption tests, and sieve analyses. PVA fibre, which is an important component in this case, has been employed to test how well the concrete will operate in its presence. The strength of the concrete block is greatly increased by the addition of PVA fibre in further amounts of 0.5%, 0.75%, and 1%. Additionally, the fibre content of PVA helps to prevent the development of block cracks. The results of the trials show that adding glass powder to concrete improves the strength of the block. PVA fibre in concrete also prevents concrete from failing immediately. The wider fissures produced by conventional techniques are entirely eliminated by adding PVA to the concrete block. At the end, successful outcomes are attained.

Comparative Analysis and Costing of a Multi-story Steel Building

Tushar Gulabrao Mahurkar (GHRCE)*

One of the most frequently utilized building materials worldwide is steel. Steel's inherent hardness, ductility, and strength make it the perfect material for earthquake design. The design engineer must be aware of the pertinent in order to take advantage of these benefits for seismic application. Based on IS 1893: 2002, IS 875 and IS 800:2007, the building frame's seismic and wind depth sign is offered in this project. The current work's objective is to design a multi-story, wind force in accordance with IS 1893:2002 and IS 875 before constructing it in accordance with IS 800:2007. The frame has eight pieces. There are four horizontal bays and five lateral bays on this building's four stories. Using these methods of analysis, a steel moment-resisting frame was created in accordance with IS 800:2007. The section underwent multiple design iterations to ensure that it met all the requirements outlined in IS 800:2007. The proposed frame was once more examined, and the outcomes in terms of the bracings used were compared. Both the RCC and the Steel building's cost-effectiveness have been compared., Finally, the calculations for the depth sign of connection between a joint's interior and exterior have been completed. In addition, the foundation's design, which comprises the base plate, there are four horizontal bays and five lateral bays on this building's four stories. Using these methods of analysis, a steel moment resisting frame was created in accordance with IS 800:2007. In the procedure, IS 800:2007 was followed. The statistics have been drawn, and pertinent calculations have been displayed.

Blade Guide in Hidden Tilt Rod Window Louver for Unplasticized Polyvinyl Chloride (UPVC) Material

Joy A Job (G.H. Raisoni College of Engineering Nagpur)*

Millions of people are shifting towards UPVC window Construction because it provides cost effective, energy efficient, recyclable and durable solution compared to traditional wood or metal designs. This paper presents an empirical investigation using Computer aided design software into the operation of window louvre devices using blade path guide for hidden tilt rod UPVC window louver. It also emphasises its shape, size, and the critical component for assessing the robustness of mechanism. This study helps in identifying a robust design for UPVC window louver.

Comparative Analysis of Two Probabilistic Models for Three-Unit Parallel System with Hot/Cold Standbys with Switching as Per Demand

Prawar Prawar (Amity Institute of Applied Science); Anjali Naithani (Amity Institute of Applied Science)*; H D Arora (Amity university); Ekata Ekata (KIET Group of Institutions)

It is important to find a reliable machine for a industry to grow and maximize its profit to compete in today's world. The probability that a system will perform as expected is its reliability. Many researchers have studied reliability of different kinds of machines that runs on both hot standby as well as cold standby. This paper gives comparative study of two three-unit parallel system with different types of standbys which are working as per demand. The comparison is done between system with hot standby (Model A) and system with cold standby (Model B). In the model A, system is working with hot standby unit. Initially two units are working at full capacity while the third unit is kept on hot standby so that standby can take over as soon as needed. In model B, system is working with cold standby unit. Two units out of three are initially working and third one is kept as cold standby for switching when required. The comparison of both models is done on the basis of factors like availability at full capacity as well as reduced capacity, MTSF of both systems, down time of systems, busy period of repairmen followed by analysis of profit. The technique used for analysis is Semi-Markov and regenerative point technique. Graphs are plotted to find out which model is best suited for the industry with similar machine type.

An Investigation at Stabilising Black Cotton Soil with Rice Husk Ash

Anil V Shirgire (Dr D Y Patil Institute Of Technology Pimpri Pune)*; sushma sawadatkar (Dr D Y Patil Institute Of Technology Pimpri Pune); Abhay Shelar (Anantrao Pawar College of Engineering and Research Parvati Pune); Vijay K Javanjal (DIT PIMPRI); Subhash Gadhave (Dr D Y Patil Institute Of Technology Pimpri Pune); Vivek S Chavhan (Savitribai Phule Pune University, Research Scholar, BSCOE and Research, Narhe, Pune-411041)

The detail study was done to stabilise "Black Cotton Soil" using an addition of Rice Husk Ash. The goal was to stabilise the soil and get the desired outcome at the lowest possible cost. Maharashtra state's Pune district the soil taken for the study. With a rise in R.H.A. content in the soil, the maximum dry density (M.D.D.) and optimum moisture content (O.M.C.) of the R.H.A.-soil mix decreased and increased, respectively. Mixtures including "rice husk ash" increased the soil's tensile and compressive strength by up to four times. The use of "rice husk ash mixture" improves the soil's shear strength. The study's findings showed that replacing 5% of the soil with rice husk ash (R.H.A.) not only makes stabilisation "economical," but also strengthens the soil.

Design and Modification of Automatic Feeding of Rubber Material in Existing Press Machine

Shashank Someshwar Nanhe (G.H Raisoni College of Engineering Nagpur)*

This project involves the design and modification of an existing press machine to incorporate an automatic feeding system for rubber material. The current process of manually feeding the rubber material into the press machine is time-consuming and labor- intensive, which can result in low productivity and increased production cost. The proposed automatic feeding system is designed to eliminate the need for manual intervention in the feeding process, thereby reducing labor costs and improving efficiency. The system consists of the conveyor belt that transfers the material to the press machine. The modification process involves integrating the automatic feeding system with the press machine and ensuring that it operates seamlessly.

A Review on Adoption of Fused Deposition Modeling in Micro Turbine Manufacturing

Shrikrishna Pawar (MGM university Chhatrapati Sambhajinagar)*

The aim of this paper is to present the systematic review of research published on fused deposition modeling (FDM) utilization in micro turbine manufacturing. The FDM process is important additive manufacturing (AM) process, used to manufacture of not only prototypes but also functional parts. In this review paper an outline of published research work on FDM use for micro turbine manufacturing is presented using a five-step approach to research methodology. The identified research work was analyzed quantitatively using bibliometric analysis and qualitatively using template analysis. In-depth analysis provided a clear picture of the level of adoption of FDM process in manufacturing of micro turbine parts. This review also reveals the challenges to and future research efforts required to enhance FDM utilization. There are other review papers on FDM available, however no study has evaluated the state-of-the-art of FDM utilization in micro turbine parts manufacturing. This review will provide additional knowledge to many FDM researchers and users to enhance their work.

Low Carbon Sustainable Inventory Model with Screening and Rework Process under Preservation Technology Investment

Surendra Vikram Singh Padiyar (Government Degree College Haldwani City)*; Ummeferva Zaidi (Chaudhary Charan Singh University Meerut); S. R. Singh (Chaudhary Charan Singh University Meerut)

Nowadays, supply chain management faces challenges in the form of emission reduction, imperfect production, and deteriorating products. Therefore, this study develops a single manufacturer and single buyer inventory model for deteriorating items, with the effect of inflation when imperfect items are produced. When production ends, the manufacturer begins screening to categories the perfect and defective items. After the screening, faulty items were sent for rework. The cap-and-trade policy is adopted to mitigate emissions. Preservation and green technology reduce the deterioration rate and carbon emission, respectively. An algorithm is used to solve the proposed model. This study furnishes the numerical illustration needed to obtain the optimal strategies for green technology investment, cycle time, and preservation technology investment. The input parameters are subjected to an extensive sensitivity study to highlight the most important findings. The result of this model shows that the rework process mitigates the emission and minimizes the total cost compared to all defective products being scrapped.

Redefining Wall Mounting of Electric Hoist through Advanced Bracket Designs

Bhavya Yadav (Indira Gandhi Delhi Technical University for Women)*; Shruti Yadav (Indira Gandhi Delhi Technical University for Women); Dhairya Arora (Indira Gandhi Delhi Technical University for Women); Saras Yogesh (Indira Gandhi Delhi Technical University for Women); Chhavi Bhadana (Indira Gandhi Delhi Technical University for Women); Manoj Soni (Indira Gandhi Delhi Technical University for Women)

With the increased use of wall-mounted devices in both domestic and commercial settings, in order to increase the strength, safety, and affordability of wall-mount brackets for electric hoists, this paper presents a design optimization study on the subject. It is critical for ensuring its efficacy and efficiency in sustaining a load while being cost-effective. This study proposes a method for optimizing the design of a wall mount bracket by taking into consideration a variety of factors such as material selection, structural analysis, and weight reduction. The cur- rent design of the bracket for the electric hoist is reviewed and analysed to identify areas where weight can be reduced without compromising its structural integrity. The system is designed to provide a safe and secure means to place big loads, such as industrial equipment and machinery, while being lightweight and cost-effective. The method comprises computer-aided design, shape optimisation, and static stress analysis to model the bracket's performance of electric hoist under loading conditions.

Role of Preservation and Green Technology in Two-Echelon Sustainable Supply Chain System with Hybrid Price Sensitive Demand under Advance Payment

"Surendra Vikram Singh Padiyar (Government Degree College Haldwani City)*; Vaishali Singh (Chaudhary Charan Singh University Meerut); Shivraj Pundir (Chaudhary Charan Singh University Meerut)"

The primary cause of the environmental system's inconsistency is rapidly increasing carbon emissions. Also, the demand function may not always be linear or constant. Considering these issues, this study develops a two-echelon sustainable inventory system for deteriorating items with a carbon cap and trade policy when customers' demand is hybrid price-sensitive. Preservation and green techniques are used to mitigate product deterioration and carbon emissions from supply chain operations. Also, for a fast-growing business, the producer demand advance payment from the retailer and, in return, offers a price discount to the retailer, which is an effective policy to turn potential buyers into regular customers. The effect of inflation is considered throughout the entire analysis. Numerical analysis based on the hybridized and non-hybridized demand function is performed to validate the present study. The results of the present study reveal that the model with preservation investment and hybrid demand is more beneficial than the model without them. Finally, the sensitivity analysis is performed to elaborate the importance of this model

Performance and Analysis of steel structure by Time History Analysis Method

Palash Prakash Pawar (G.H.Raisoni College Nagpur)*

In the codal method of design, steel building are constructed from structural steel section and are created using the basis code prescriptive guidelines. The Performance of the buildings cannot be controlled during such a design process. In steel construction the desired performance can be attained by select-ing the appropriate section. Now days steel structure are a popular type of structure in many nation and its financial as well . It is essential to research seismic behavior of structure in different zone which are designed by code guidelines. In the present study we consider a G+6 story structure of zone iv and with the help of ETAB software we find out the performance level of the section under seismic action. This review also focus on the different plat-form, methodology to be used by researchers.

Design and study of the load behavior of a steel angle and tube-based three-dimensional roof truss. Comparison of the angel and tabular portions

Siddharth S Tode (Ghrce, Nagpur)*; Kuldeep Dabhekar (Ghrce, Nagpur); Isha Khedikar (Ghrce, Nagpur)

The five main goals of utility, economy, efficiency, safety, and aesthetic must all be met in a structural design and analysis of a three-dimensional roof truss. This paper compares the economics, weight, and efficiency of tubular and angle section structures Using STAA-PRO software, the analysis, and design are carried out step-by-step for a 30 m straight truss and curved section while taking into account all loads and load combinations. Since the weight of the angle section is greater than that of the tubular section, In order to show that the tubular structure is more economical than the steel structure, the findings are compared and verified.

Thermodynamic Analysis of an Organic Rankine Cycle using Waste Heat from an Integrated Fuel Cell Combined Cycle Power Plant

Nitesh Kumar Choudhary (National Institute Of Technology Durgapur)*; Sujit Karmakar (Nit Durgapur)

A detailed thermodynamic study is carried out of an Organic Rankine Cycle (ORC) coupled with the flue gas exhaust of a 100 MWe Integrated Gasification Fuel Cell (IGFC) combined cycle. The ORC is a thermodynamic cycle that operates similarly to the conventional Rankine Cycle, using organic fluid as working fluid instead of steam. Organic fluid is considered due to its lower boiling point, allowing it to extract heat from low-temperature sources, such as waste heat, geothermal energy, or solar thermal energy. In this study, the ORC generates additional electricity by extracting waste heat from the flue gas exhaust of the IGFC combined cycle plant and uses n-pentane as its working fluid. High-ash Indian coal is used as a fuel in the plant. The simulation flowsheet program "Cycle-Tempo" models and simulates the proposed ORC-IGFC combined cycle power plant. The thermodynamic analysis reveals that the ORC produces a net power output of 671.07 kW with energy and exergy efficiencies of 13.97 % and 49.69 %, respectively, with a cost of electricity of ₹2.35 per kWh and a payback period of 2.77 years. This study also shows that the condenser (40.56%) experiences the maximum exergy destruction ratio, followed by the evaporator (24.51%). This additional power can avoid around 14.65 tonnes of CO2 per day when compared with the coal-based power plant for producing the same.

An Analysis of Multi-Criteria Decision-Making Methods for Optimizing the Flat Plate Solar Air Heater Performance Enhancing Parameters

Asfar H Siddiqui (YCCE); Obid Meyliev (Tashkent Institute of Finance); Ashutosh Pandey (SRMS CET Bareilly); Mohammed Saleh Al Ansari (Department of Chemical Engineering University of Bahrain); Abhishek Thakur (Shoolini University)*; L Malleswara Rao (Shri Y N College (A) Narsapur); Raj Kumar (Shoolini University)

"Multi-criteria decision making (MCDM) techniques have been used by the various researchers in various fields to select the finest choice among numerous alternatives from the early 70s. MCDM is a branch of operational research that aids in making decisions by weighing competing criteria and additional variables. There has been a lot of progress, and additional research is still being done to make MCDM more feasible and dependable. In order to select the optimal geometrical parameters in the heat transfer enhancement of flat plate solar air heaters, this review study conducts a literature assessment of several optimization methodologies. The issues with have been laid forth via in-depth reviews, previous studies, reports, and journal publications. The findings of this review paper may be very beneficial for different researchers in selection of best experimental parameters which will save time and cost involved to designing experimental setup.

A Comprehensive Review of the Influence of Nanomaterials on the Thermal Performance of a Solar Thermal Collector

Tanya Sood (Shoolini University)*; Pawan Kumar (Shoolini University); Asfar H Siddiqui (YCCE); C. Balakrishna Moorthy (University of Technology and Applied Sciences, Salalah); Jinesh Menaria (Mohan Lal Shukhadia University, Udaipur); Maheswara Reddy Mallu (Koneru Lakshmaiah Education Foundation, Vaddeswaram); Divya Tyagi (Starex University, Binola); KRISHNA PRASAD S (NMAM Institute of Technology, Nitte, Karkala); Mohammed Saleh Al Ansari (Department of Chemical Engineering University of Bahrain); Abhishek Thakur (Shoolini University)

The present review article investigates into the utilization of nanomaterials with the aim of augmenting the thermal efficacy of solar thermal collectors (STCs). A comprehensive analysis is conducted on the STC through the

utilization of nanomaterials, leading to an improvement in its performance. This evaluation highlights the similarities in the results through an in-depth discussion on several types of criteria that might impact the performance of solar air heaters. In order to justify and, finally, explain the behaviours of nanomaterials for the purpose of thermal augmentation of STC, analysis was carried out and is being discussed here. An inclusive study based on a substantial quantity of previously published research has demonstrated that the utilization of nanomaterials can enhance the heat-absorbing capacity of the STC.

Influence of Absorber Plate Material and Design on the Thermal Performance of a Solar Thermal Collector: A Comprehensive Review

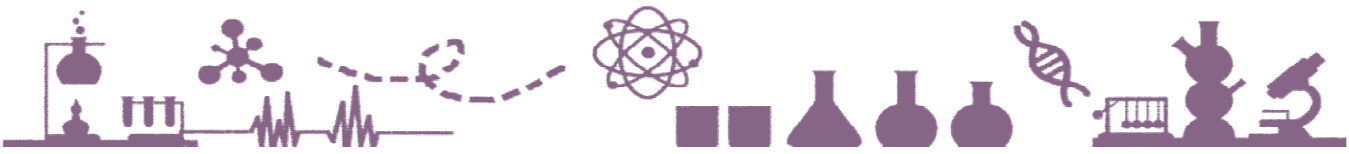
Tanish Kashyap (Shoolini University)*; Robin Thakur (Shoolini University); Shaik Chandini (Lincoln University College,); C. Balakrishna Moorthy (University of Technology and Applied Sciences,Salalah); Jinesh Menaria (Mohan Lal Shukhadia University); Lakshmana Kishore T (, University College of Engineering, JNTUK Kakinada); Dr Harishchander Anandaram (Amrita Vishwa Vidyapeetham); Naveen Rana (Maharishi Markandeshwar (Deemed to be University) Mullana-Ambala, Haryana, INDIA-133207); Nimish H Vasoya (Sanjaybhai Rajguru Science College); Raj Kumar (Shoolini University)

Due to rapid economic growth and growing populations, energy consumption is on the rise, outstripping the capacity of traditional energy sources. Using alternative energy sources is one way to tackle these concerns. Solar thermal collectors (STC) is equipment that capture solar radiation and then use that heat to warm a fluid that runs through them. The solar thermal absorber is an essential component of a solar air collector that must be taken into account when calculating the system's overall efficiency. A solar air thermal collector's (STC) operating temperature and thermal energy storage capacity are very sensitive to the absorber plate's form and material. The objective of this review article is to examine the usage of various absorber plate materials and their design by distinct researchers in order to improve the thermal performance of solar thermal collectors. The present investigation aimed to assess the influence of different absorber plate materials and configurations on the performance of STC. Comparisons have been carried out to evaluate the impact of different absorber materials and absorber plate shapes on the performance of solar thermal collectors.

An analysis of Absorber Models for Enhancement of Thermal Performance of Solar Air Heater

Nitin L, Kumbhare (Government College of Engineering, Chandrapur)*

This paper presents a review analysis of absorber models used for enhancement of thermal performance in solar air heater. Rough Surface and different obstacles play a key role in improvement of thermal parameters. By review it is identify that the impact of obstacles over the surface of absorber plate more than the flat surface of absorber plate. Turbulence generate by roughened Surface and obstacles over the surface area and boundary of the channel breaks the laminar flow improving the internal temperature of the flowing air of solar air heater. In analysis different models of obstacles and corrugated surface provide on absorber plate. Each barriers design on absorber surface plate models impacts on different parameters on the surface absorber plate in solar air heater. Modified absorber plates with different shapes of flow breakers and flow restrictor increase the Nusselt number, Reynolds number, friction factor and thermal efficiency in result analysis of review. In present review the different thermal parameters are analyses through implementing various methodologies and analysis of the results done by different design model systems. By literature review study identify that the development of more accurate and efficient geometrical models with modeling absorber shape lead to best thermal performance of solar air heater.



Rotational Motion of a Stewart Platform with Solid Works Modelling and Matlab Simulation

Sibsankar Dasmahapatra (Kalyani Government Engineering College)*; Souvit Mondal (Kalyani Government Engineering College)

In this paper the solid work modelling of a Stewart Platform for rotational motions has been done. Three basic rotational motions as roll, pitch and yaw of sinusoidal motion with different amplitude have been studied with solid works modelling. The inverse kinematic modelling has been formulated in this work to find out the individual piston motion of the Stewart Platform. The corresponding piston motion have been extracted for the rotational motions and depicted with help of Matlab Simulation. The maximum range of the platform motions have been have also established and tabulated which can be implemented in real time applications. The maximum possible range of the roll motion is with 180 amplitude, pitch motion with 170 amplitude and yaw motion with 140 with the available piston stroke length of 150mm.

Modelling and diagnosis of faults in rolling element bearing running at constant speed

Samrat Mandal (NIT Durgapur)*

Every rotating machinery has a unique vibration signature which can vary with the introduction of various faults. Experts can easily monitor the vibration response and ensure the machine is in running condition. In the present study, a bearing kinematics based 7 degrees of freedom (DOFs) model is considered to find the response of the bearing in healthy as well as in faulty conditions (considering localized faults). The equations of motion of the planar block diagram model of the rolling element bearing system are solved in MATLAB-Simulink environment to study the response of the healthy and faulty bearing system. Cage and traction dynamics are not considered to maintain the model's simplicity. Spectra Quest's machine fault simulator is used in experiments using a variety of prefabricated faulty bearings. Frequency domain characteristics of vibration signals acquired from simulations and experiments are compared, which leads to conclusions about the applicability of the developed model.

Influence of Geometry Correction Factor on Fatigue Crack Growth of a C-Shaped Edge Cracked Specimen

Sourav Pattanayak (Haldia Institute of Technology)*

The purpose of this work is to look at how the geometry correction factor (GCF) affects the fatigue crack growth rate (FCGR) and fatigue life of a C-shaped edge cracked specimen. The geometric form of the cracked specimen greatly influences fracture characteristics under static and dynamic loading conditions. The stress intensity factor (SIF) is derived using the linear elastic fracture mechanics (LEFM) concept with maximum and minimum tensile loads. Under cyclic tensile stress, cracks start developing, and Paris law is used to anticipate crack propagation in relation to the number of load cycles. Crack growth is greatly influenced by material properties, shape, and the variation in stress intensity factor between maximum and minimum loads. In this analysis, the stress ratio (SR) is maintained at 0.1. Based on Paris law, an analytical method is developed to quantify incremental crack formation with regard to the number of loading cycles for the various non-dimensional geometrical factors. The results show that choosing the appropriate size of the cracked specimen mitigates the crack growth rate and so extends life in terms of loading cycles.

Replacement of Cement with Plastic Waste for the Production of Paver Blocks

Durga Vara Prasad Bokka (Vishnu Institute of Technology)*

This project entails recycling waste plastics into paver blocks and researching their properties. This comprises the creation of a plastic paver block as well as the extraction of fuel. In general, the blocks are utilized to create a pavement or hard standing as a decorative material. Plastic garbage, which is a sort of solid waste, is a big issue in practically every country. The main goal of this project is to recycle the needed plastic and utilize it to make paver blocks instead of cement. Tons of plastic garbage are created in India each year, and it takes a long time to disintegrate. Dumped garbage pollutes the surrounding environment, affecting both humans and animals in direct and indirect ways. Because the use of plastic cannot be eliminated, an alternate answer is to recycle the garbage and use it in the building industry. When plastic is melted, it works as an excellent binding medium. As a result, it may be used to make paver blocks. The fumes or vapors created during the melting process are not directly exposed to the atmosphere; instead, the fumes are contained by creating a particular set-up that aids in the extraction of the fuel. The blocks made of recycled PET plastic can withstand heat and fire up to 250°C, so they are heat-resistant. Utilization of plastic in paver blocks reduces weight and is economical and advantageous. These paver blocks are highly recommended for use in no-traffic areas and moist environments due to their low water absorption capacity and satisfactory compressive strength.

Crowd monitoring and suspicious behavior detection using Deep Learning

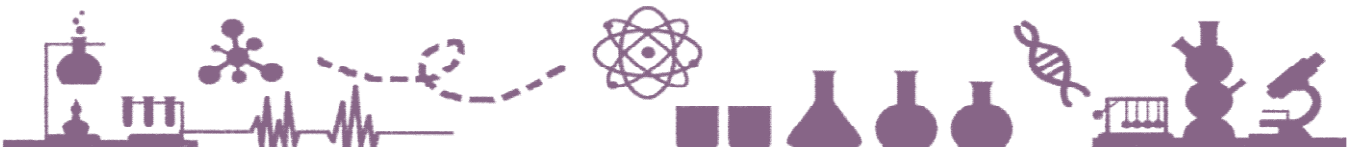
Rashmi Ramteke (Dr. D. Y. Patil Institute of Technology)*; Chaya Jadhav (Dr. D. Y. Patil Institute of Technology)

In today's scenario with the rapid increasing population, it is difficult to manage the security during the public events, family functions and at various crowded areas using the manual intervention of security personals. At many places, the CCTV cameras are available for monitoring the crowd through video streaming. But, it is tedious task and continuous manual observation is needed, which may also be erroneous and can lead to skipping of identifying crowd suspicious activities. To avoid the manual intervention, the need of human efforts to continuously monitor the crowd streaming and erroneous results, the researchers have proposed the intelligent and smart crowd monitoring and suspicious activity detection using the deep learning approach. The various attempts have been made in the past, but accuracy is still the big concern where false alarms are raised and false negatives are also happening. To reduce these false positives and false negatives, we are proposing the model to detect suspicious activities in the crowd accurately and also within quick time to prevent any unwanted activities take place.

Thermal and hydraulic performance are investigated numerically for fully developed turbulent flow inside a heat exchanger tube with fan inserts

Abhiskek Kumar (Gupta); Akashdeep Negi (Graphic Era to be Deemed); Harvindra Singh (Graphic Era Deemed to be University)*; Chandra Kishore (Graphic Era (Deemed to be University), Dehradun, Uttarakhand, India)

The presented model is a Heat exchanger tube model with inserts of multiple fans inserts part and the inserted fan inserts attached to number of fans. On the basis of these inserts, the present study is analysis to enhance the numerical results with the variations of Reynolds number (Re = 2500 - 14500), Pitch space between the roughness (P = 45, 65, 85, and 105 mm). These variations are pretended to enhance maximum thermal energy with minimum loss of energy and due to these variations of parameters, the model created better environment for heat transfer rate and observed 329.53% increment of heat transfer with compare to transfer of heat in smooth tube and found



thermal performance ηmax = 1.98 at Reynolds number (Re = 14500), number of multiple fan inserts Nf = 4 and gap angle of attack between inserts θf = 30° (d = 12 mm), and pitch space between roughness (P = 45 mm).

A Comprehensive Review on Trade-off Parameters Affecting the Productivity of Solar Still: Climatic, Design, and Operational Parameters

Akashdeep Negi (Graphic Era to be Deemed)*; Rajesh P. Verma (Graphic Era Deemed to be University); Harvindra Singh (Graphic Era Deemed to be University); Lalit Ranakoti (Graphic Era Deemed to be University); Jayanti Shukla (Graphic Era Deemed to be University)

Decontaminated water availability in society is becoming a more significant issue every day. Even though there are many ways to purify impure water, these solar still devices are gaining academic attention because of their versatility, affordability, and sustainability. An overview of the many factors influencing Solar Still's productivity is given in this paper. These climatic, design, and operational parameters play a significant impact in improving the performance of the Solar, despite being factors. This paper covers the fundamentals and concentrates on improving the productivity of the Solar still with the aid of internal and exterior attachments. The study's findings were also used to draw several conclusions. The still's design and sun intensity was discovered to be the most crucial elements for greater efficacy. Compared to other designs, the pyramid solar still generated the highest distillate, making it the best choice. Numerous other elements were accountable for improved distillate are also mentioned for a favourable viewpoint on the Solar still.

Couple Stress Effect in a Darcy Maxwell Ferromagnetic Fluid under Temperature Gradient

Richa Rani (S.D. (P.G.) College, Muzaffarnagar)*

This paper describes a study of a horizontal Maxwell ferromagnetic fluid layer subjected to heat that is confined between two infinite free-free boundaries. A Darcy Maxwell model is implicated on a ferromagnetic fluid layer. The effect of couple stress is taken into consideration. The eigenvalue problem is solved by utilizing the weighted residual Galerkin approach. The expression for the Rayleigh number has been obtained for stationary and oscillatory convection. For the case of stationary convection, it is noticed that the Maxwell ferromagnetic fluid turns into a Newtonian ferromagnetic fluid. The effects of the parameters governing the system has been discussed analytically and graphically. A comparative study has also been performed indicating that the presence of couple stress in the fluid delays the convection.

Linear Translation Motion of a Stewart Platform with Solid Works Modelling and Matlab Simulation

Sibsankar Dasmahapatra (Kalyani Government Engineering College)*; Souvit Mondal (Kalyani Government Engineering College); Mintu Ghosh (Bengal College of Engineering and Technology)

The solid work modelling of a Stewart Platform for linear translation motions has been performed in this paper. The sinusoidal motions with different amplitudes of three linear translation motions as surge, sway, heave have been studied with solid works modelling. The inverse kinematic modelling of the Stewart Platform has been done in this paper. The corresponding piston motions for the linear translation motions have been formulated with help of inverse kinematic modeling. The piston motions from the solid work modelling and inverse kinematics modelling have been illustrated and portrayed in this paper. The maximum range of the platform motions have also been found out and tabulated which can be used in real time applications. The maximum possible range of the surge

motion is with 100mm amplitude, sway motion with 90mm amplitude, heave motion with 100mm with the available piston stroke length of 150mm.

Linear Motion of Low Cost Electric Actuator with PID Controller

Sibsankar Dasmahapatra (Kalyani Government Engineering College)*; Mintu Ghosh (Bengal College of Engineering and Technology); Aritra Karar (Kalyani Government Engineering College); Pratyush Jyoti Roy (Kalyani Government Engineering College)

A low cost linear Electric Actuator with the well-established PID controller has been controlled in this research work. The feedback mechanism of the Electric Actuator is utilized by the PID controller to track the displacement of the Actuator towards the target position. Real-time experiments carried out in LABVIEW interfaced with Arduino-UNO with steady state response as step motions to get responses which are useful in modern industrial automation. By a number of real-time experiments with different amplitudes as 70mm, 100mm, 120mm, 150mm of extension and retraction motion of step responses, the precise control of responses have been demonstrated in this work. The sinusoidal motion with different amplitude and frequencies also have been studied. The step and sinusoidal responses have different types of industrial applications. The control parameters as Integral Absolute Error-IAE, Integral Time Absolute Error-ITAE and Control Effort-CE for each responses have been observed to study the effectiveness of the controller.

Performance enhancement of an Evacuated Tube Solar Air Heater using different design of Inserts

Sushil kumar (Hansraj College)*; Satish Chand (Hansraj college); Meena Kumari (Hindu college)

The aim of the present work is to provide a comprehensive review of the previous studies on performance enhancement of evacuated tube solar air heaters (ETSAH). The evacuated tube solar air heaters (ETSAH) have been used for the efficient capture of sun energy and its conversion into thermal energy for various heating applications. The present investigation's goal is to provide a comprehensive literature assessment of the recent advancements in the field of ETSAH. Numerous insert designs used for heat transfer enhancement in ETSAH are reported and discussed in the present work. Various types of roughness; Baffles, ribs, fins and coils, helical inserts, twist tape, and other insert designs used to enhance the performance of ETSAH are discussed. A comparative performance assessment has been done to identify optimum parameters of insert designs to select the ideal configuration that can result in best performance of ETSAH

Evaluating the Sustainability of Concrete Prepared with Supplementary Cementitious Materials Containing Different Percentage of Recycled Concrete Aggregate by Performing Durability Properties

Sonali Pandey (Birla Institute of Technology Mesra); Puja Rajhans (Birla Institute of Technology Mesra)*

This study focuses on the durability properties of concrete prepared with incorporating different Supplementary Cementitious materials (SCMs) along with partial replacement of Natural Coarse Aggregate (NCA) with Recycled Concrete Aggregate (RCA). The SCMs i.e., Fly Ash (FA), Ground Granulated Blast Furnace Slag (GGBS) and silica powder are used in different percentage as a replacement of cement. By using these SCMs three different blends are formed i.e., binary blend by combining (cement and FA), ternary blend (cement, FA and GGBS) and quaternary blend (cement, FA, GGBS and silica powder). These blends are taken for preparing concrete and the selection of best blend is done after conducting mechanical property test which is compressive strength. Further, the blend

which achieves highest compressive strength (56% cement, 15 % FA, 25% GGBS, and 4% silica powder) is used as a reference blend for production of recycled aggregate concrete by replacing NCA with RCA. For preparing sustainable concrete & environmental friendly system, RCA is used in different percentages. Moreover, the concrete prepared with quaternary blend along with varying proportions of RCA is examined for durability properties. These durability property tests are water absorption, sorptivity and permeability of concrete after normal curing for 28 days. From the findings it is observed that incorporating the optimal percentage of SCMs led to reduced water absorption and permeability depth. This is due to the effectiveness of SCMs in reducing capillary suction, enhancing waterproofing, and improving durability of the RAC. Furthermore, the study explores the correlation between compressive strength, water absorption and permeability for concrete mixes containing various percentages of RCA. The findings highlight the suitability of recycled aggregate as a viable building material, showcasing its potential in sustainable concrete practices.

Experimental Investigation of Jute Fiber as a Tilted Wick Inside Single Basin Single Slope Solar Still

"Akashdeep Negi (Graphic Era to be Deemed)*; Rajesh P. Verma (Graphic Era deemed to be university); Ashish Bist (Graphic Era Deemed to be University)"

Solar energy has evolved as a viable and sustainable alternative to traditional energy sources, with tremendous promise for addressing the global energy problem and mitigating environmental challenges. Using solar stills, solar energy can be utilized to cleanse ocean water near coastal locations, making it drinkable. The current research attempts to increase the distillate yield of a typical solar still. The current study intends to improve the distillate production of a typical sun still by conducting an experiment on a single basin single slope solar still. The modified solar still (MSS) was created by modifying the traditional sun still (CSS) with a jute fiber inclined wick inside the basin. The wick's inclination is determined by the latitude of the place. To avoid shadows at the corners, the length-to-width ratio was kept at 3:1. The trials were carried out to determine how jute fiber as a wick, wind speed, and solar intensity all affected CSS distillate production. The overall distillate yield was 2.69 kg/m2/day, with CSS and MSS yielding 3.208 kg/m2/day.

Thermal Analysis of Disk Brake Assembly for Enhanced Heat Dissipation Rates

Shivendra Kumar Mishra (Department of Mechanical Engineering, IES college of Technology, Bhopal, Madhya Prdaesh, India); Ravindra Mohan (Department of Mechanical Engineering, IES college of Technology, Bhopal, Madhya Prdaesh, India); Santosh Kumar (Chandigarh Group of Colleges Landran Mohali Punjab)*; Geetesh Goga (IES College of Technology, Bhopal)

An effective braking system in automobile is one of the most significant safety elements, as it helps to slow down or stop the vehicle within a shortest possible distance. However, the brakes become extremely hot when the Kinetic energy (K.E.) is converted into thermal energy and may stop functioning if they are not capable to adequately discharge this heat. Hence, it is intended to absorb up to 80% of heat produced while braking, making it an ideal heat sink. In order to keep the braking system cool, the rotors must be cleaned as well as dried by the dragging of the brake pads over them. In simple words, the optimal design of rotor disc as well as disk pad can promote cooling, which is essential for an effective braking system. Hence, in the current research paper, 5 different design of rotor disc as well as disk pad have been designed with help of SOLIDWORKS with the aim of enhancing the heat dissipation rate. Then ANSYS Workbench is used to assess the thermal findings and analyzed for their effectiveness

for greater heat dissipation. The design with cut pads and having holes all throughout the rotor surface have been found more efficient in heat dissipation and also with a minimum weight of 4.63kg.

Optimization of Micro-ECDM Parameters for Optimum Micro-channelling Performances on Glass by Using Taguchi Technique

Dr BIJAN MALLICK (GIMT)*

It is well known that the demand of micro-machining in manufacturing industries increases rapidly day-to-day; while, optimization of micro-machining parameters is very challenging issue for optimal micro-machining performances. The present research work is aimed toward optimize the micro-ECDM (Electro Chemical Discharge Machining) parameters like applied voltage, electrolyte concentration, duty ratio and pulse frequency on the optimum micro-channeling performances on borosilicate glass. Micro-ECDM tests were performed on borosilicate glass in well-established ECDM set-up under different applied voltage, electrolyte concentrations, duty ratios and pulse frequencies. Several micro-ECDM performances on glass like material removal rate (MRR), surface roughness (SR), radial overcut (ROC) and heat affected zone (HAZ) were investigated for every matching test condition. The signal noise (S/N) ratio and best fitted ANOVA analysis as-well-as predicted results, mean and standard deviation has been propounded during micro-channel machining process. Heat affected zone, radial overcut and morphology of debris were investigated under scanning electron microscope. The micro-ECDM parameters have been optimized by applying Taguchi Technique on the experimental results and observations followed by validation of optimized parameters through experimental study. The optimum micro-channeling performances during micro-ECDM process on glass are observed at applied voltage of 50 volt, 25 wt% electrolyte concentration, 0.5 duty ratio and 50 Hz pulse frequency.

Performance of steel structure on various earthquake zones

Palash Prakash Pawar (G.H.Raisoni College Nagpur)*

Earthquakes are a natural occurrence that can occur abruptly and result in significant destruction. The majority of Indian soil is unstable due to earth-quake-induced vibrations. In contrast, while it is impossible to stop earth-quakes from happening, the damage can be reduced with the help of effi-cient seismic designs. By taking into account several limit states outlined by the rules and using the affordable ones, the design can be completed. Semi-elastic design of the structure is more cost-effective than elastic design be-cause whole elastic response design of the structure is highly expensive. In the codal method of design, steel building are constructed from structural steel section and are created using the code basis prescriptive guidelines. The Performance of the buildings cannot be controlled during such a design pro-cess. In steel Constructions, the desired performance can be attained by se-lecting the appropriate section. Now days steel structure are a popular type of structure in many nations and its financial as well. It is essential to research seismic behavior of structure in different zone which are designed by code guidelines. This technique employs an algorithm based on computer pro-gramming ETAB-19. In this we considered spectral computational ground motion data (sgm)The Building operations are carried out in accordance with historical precedent. analysis (direct numerical integration method (DNI)) and pushover analysis..

Designing of Shredder Machine for Recycling Post Consumer Denim Waste

Vivek Ramesh Sharma (Government College of Engineering, Chandrapur)*

India has a population of about 1.35 billion in 2020 and and as fabrics account for 4% of India's GDP, customers spend roughly 68 billion dollars on apparel and footwear each year. Currently, the short lifecycles of apparel product due to rapid fashion cycles and increased buying power of Indian consumers in urban as well as in rural areas is resulting in significant amounts of postconsumer textile waste in the form of used clothing. Denim is one of these prominent textile wastes, and while being formed of cotton fibres, it takes a long time for it to decompose in landfills. One of the crucial activities in the processing of post-consumer denim waste is cutting it to the necessary size. The motor-driven shredder machine can be used for cutting. Thus, this paper offers calculations of the designing of dual rotor electrical driven shredder machine. The geometry of the blade, the orientation of the blade, and the distance between the blades are thought to be the main factors in the design of the shredder blade. A spline shaft is made to orient the blades at precise angles since blade orientation impacts shredding performance. To ensure the safe design of the shredder machine's parts, the static analysis of the shredder blade and shaft is carried out using SoildWorks in this paper.

Thrust Analysis of Multi Catalytic Solid Propellant

Malkapuram Devaiah (Geethanjali College of Engineering and Technology)*; Dr. Malakapuram DEVAIAH (Geethanjali College of Engineering and Technology)

Solid propellants usually are chemicals wherein the fuel and oxidizer are mixed together along with a catalyst in some cases to raise the reaction. The propellant should provide adequate force with low expense and small complexity in manufacturing. The variations in its compositions and quantity can be changed in order to generate and maintain the thrust. A catalyst used in such propellant usually fastens the rate of oxidation of fuel by generating very hot gases at high pressure. A very broad ways of using multiple catalysts have been under research and observation. The current propellants use a single catalyst and a mono propellant in order to economize and lower the complexities involved in manufacturing. Lower catalytic activities also delay the active oxidation. Fat based hydrocarbons (20%) and Potassium nitrate (60%) being major parts of the propellant, ferric oxide (2%), aluminum dust (5%), potassium permanganate (3%), polymer binder (8%), organic enzymes(2% from the fat based hydrocarbons) have been used in the fuel to be analyzed as catalysts and enhancers. Proportions used to change depending on the thrust required and burn time preferred. The tested propellant has been preferably incorporated into a stainless steel body and a mould nozzle has been readily put through a designed flow control and develops the thrust. A highly efficient reaction motor has been obtained with the least complexity, and 292 grams of solid propellant given 3.5N of thrust in the impulse time of 80 seconds followed by a very economic design.

Rural Electrification Through Techno-Economic Analysis of Hybrid Renewable Energy System: A Case Study of North-East, India

NAGENDRA KUMAR (National Institute Of Technology Durgapur)*

This study aims to electrify a remote village, Birdhanpara, Manubankul, Tripura, India, with uninterrupted supply and local resources. The village has a small population (98 people) with 45 households and an average electricity demand of 95 kWh/day. The majority of the population depends on cultivation and animal husbandry. It is resulting in the availability of biomass for the biogas generation. Hence, a hybrid renewable energy system (HRES) is proposed for the electrification of the village. The HRES comprises PV, bio-generator, storage and converter. The optimization of the HRES is performed through an algorithm-based software HOMER@ Pro. To ensure the uninterrupted supply of electricity, 0% of capacity shortage is considered. The result reveals that the optimal system

consists of 20 kW PV, 5 kW bio-generator, 12 kW of converter and 69 kW storage with a net present cost of Rs. 2.36 million and the cost of electricity is Rs. 5.26 kWh/day. Furthermore, the system generates 47492 kWh/year of electricity (62% from PV and 38% from Bio-generator) and serves an electricity load of 34670 kWh/year with an excess electricity generation of 23.8%. The community can further utilize this electricity for water pumping, street lighting, etc. The hourly performance shows that the daytime (06:00 to 18:00) electricity is supplied through the PV with or without the help of the storage and the bio-generator is off, and the rest of the time, the electricity is supplied from the bio-generator only with a total biogas consumption of 9.08 ton/year and follows sustainable development goal-7.

Simulation of a Mechanical System Using a Game Development Engine

Thanikaivelan A (Dr Mahalingam College of Engineering and Technology)*; Sarvesh B (Dr Mahalingam College of Engineering and Technology)

This work is an approach to developing an interactive virtual simulation of a mechanical system using a game development engine. A simple CAD assembly of torque convertor available on the internet has been used to develop the simulation. One of the popular game development engines UNREAL ENGINE 5 by epic games has been used to create the virtual environment and simulation logic. The reason for a game development engine being chosen for this purpose of mechanical assembly simulation is discussed in this paper, along with the reason for the unreal engine being used. The next upgrade to this work and the possible future development are also included.

Modelling and fault diagnosis of spur gear with increasing level of faults

Chintamani Mishra (NIT Durgapur)*

To ensure the dependability and effective operation of mechanical systems, it is crucial to correctly diagnose the gear faults. This paper presents a comprehensive study on modeling and diagnosis of spur gear faults with an increasing level of faults. To achieve this, a mathematical model of 6-DOF spur gear system is modelled by considering the dynamic behavior and interactions of gear teeth. In modelling factors such as gear tooth stiffness, meshing force and bearing characteristics among other are taken in to consideration for accurately simulate the gear dynamic system under different operating conditions. Using this model, fault scenarios are simulated by introducing increasing level of fault, i.e. broken or missing tooth. The effects of these faults on the gear systems dynamic response and vibration characteristics are thoroughly investigated. For fault diagnosis, obtained vibration signals from gear system are analyzed in time as well as frequency domain. Feature extraction method, such as statistical analysis is applied to capture the unique fault signatures present in the vibration signals. The proposed diagnostic framework demonstrates promising result in terms of accuracy and reliability in detecting and diagnosing gear faults.

A Comparative Study on Column Supported Shear Wall buildings

Pritam Hait (CVR College of Engineering Technology)*; B. Ashok Reddy (CVR College of Engineering)

In high-rise shear wall (SW) buildings, the public lobby area at ground floor restricts the entry into the parking. These can be solved by providing broad opening through widely spaced columns in the shear wall. There are short comings in the existing design practice is that it does not consider the interaction between the supported columns and shear walls above them. Thus it leads to ineffective design of internal forces of structural members and also the subsequent detailing of the steel reinforcement. Generally in any building has wall supported by columns (with

openings) and conventional shear wall structure starting from foundation (without openings). In this research the stress behaviour of column supported shear wall due to the interaction effect has been studied. For this purpose, two buildings have been analysed and designed in CSI ETABS. The models have been analysed under different load combinations as per IS 456 2000 and IS 1893:2016, to find out the stress behaviour in column supported shear wall. From the result it is found that the column supported SW performing better in terms of displacement, Inter storey drift (IDR), axial stress, shear stress, bending stress, and storey stiffness with compared to conventional continuous SW.

Seismic Analysis of Multi-storeyed Building Considering Planner Irregularities

Pritam Hait (CVR College of Engineering Technology)*; Deepika Karna (CVR College of Engineering)

In this paper the engineering demand parameters (EDPs) are determined for regular and irregular buildings. For this purpose a square and T-shaped buildings are considered. The buildings are designed and analysed in CSI ETABS software as per IS 456:2000 and IS 1893:2016. Since the seismic zone 4 and zone 5 are the most vulnerable therefore, these two regions are considered for the present study. The displacement, inter-story drift (IDR), and base shear have been determined as EDPs of the considered regular and irregular buildings. The results of the analysed buildings indicate notable differences between the square and T-shaped buildings in terms of EDPs in both zone 4 and zone 5. In zone 4, both square and T-shaped buildings are showing relatively similar behaviour, with moderate difference in displacement and IDR.

Effects of Process Parameters of Plasma Arc Cutting on Stainless Steel and Structural Steel

Mehmet ERBİLEN (Yildiz Technical University)*; Orhan Çakir (Yildiz Technical University)

Plasma arc cutting is a non-conventional manufacturing process that has the potential for modern-day metal cutting demands with good dimensional accuracy and high-quality surfaces without additional operation. In this experimental study, AISI 304 and ENS235JR sheet materials which are 5 mm of thicknesses have been cut with plasma arc cutting. Each material has been cut with 12 different variations. Current and cutting speeds changed as process parameters. The quality of the cut has been monitored by measuring the edge roughness, conicity, size of the heat-affected zone (HAZ), and hardness of the heat-affected zone (HAZ) the results have been compared.

Parametric Optimization of Orthopaedic Bone Drilling to Achieve Minimum Heat Generation

Pinaky Bhadury (Siliguri Institute of Technology)*; Srija Sarkar (Jalpaiguri Government Engineering College); Soumil Banik (Jalpaiguri Government Engineering College); Ankur Paul (Jalpaiguri Government Engineering College); Sumitava Paul (Jalpaiguri Government Engineering College); Nripen Mondal (Jalpaiguri Government Engineering College)

The practise of surgical bone drilling has transformed orthopaedics and significantly enhanced outcomes in procedures like bone grafting, joint replacement, corrective osteotomies, dental implants, etc. However, there are some limitations to human bone drilling that must be addressed critically. One of the risks associated with this procedure is thermal necrosis or osteonecrosis or impairment of osteogenic potential. Eventually, the cellular death of bone tissue occurs when the bone temperature rises above 47°C, known as the critical limit. Additionally, heat-related complications in nearby soft tissues, such as muscles or nerves, can result in postoperative pain, swelling, or other adverse effects. This study examines the effect of bone drill parameters on preventing thermal necrosis using

an experimental and statistical methodology. Swine bones, which have characteristics similar to human bones, were used in the experimental research of bone drilling at a high speed on a mini CNC. The thrust force experienced during bone drilling was measured using a force dynamometer, and the temperature near the drill zone was recorded using an Arduino UNO setup. During surgery, a thermocouple detects the temperature of the bone. In this present investigation, drill bit diameter, rotational speed, and feed rate were investigated in order to reduce the impact of drilling on bone tissue. Diameter of drill bit, speed and feed were varied from 1 to 5 mm, 12000 to 35000 rpm and 11 to 21 mm/m respectively. It has been observed that temperature varied from 32.8 to 45.68°C, and the lowest temperature was observed for the parametric combination: diameter= 5 mm, speed= 35000 rpm and feed= 16 mm/m. These findings can be applied to robotic surgery and decrease drilling force and temperature. The results showed that high-speed drilling reduced process force and temperature significantly. Precise temperature forecasts are possible with the aid of ANOVA, and the Taguchi L9 array.

A Review-Recent Development in the field of Desiccant based air Conditioning

Sonendra Sharma (Delhi Technological University(DTU)and KIET Group of Institutions, Ghaziabad)*; Dr. Raj Kumar Singh (Delhi Technological University(DTU)); Dr. Manjunath K (Delhi Technological University(DTU))

Energy Consumption for space cooling is increasing very rapidly. Energy consumption for space cooling was 7000 petaJoule or 2.3 billion units in 2021. Globally, space cooling energy demand rose over 6.5% in 2021, with growth close to 8-9% in Asia Pacific and Europe. Electricity demand for space cooling in buildings could increase by as much as 40% globally by 2030. World AC demand It is found that Vapour compression based air-Conditioning system are not energy efficient for Hot- and humid climatic condition and evaporative cooling systems are not effective in hot and humid. Desiccant-based air- Conditioning system combined with direct evaporative coolers present an attractive option for air-conditioning in hot and humid climate. Conventional Vapour compression based cooling system are inefficient in latent cooling load. This paper reviews the recent development done in the field of desiccant based air-conditioning system. It explain working principle, performance and operating parameters, numerical modelling and experimental work done so far.

Influence of wishbone vortex generator in flow separation delay of NACA 66(2)-215 wing surface

Karthik J (Saveetha School of Engineering)*; Navin Kumar Balasubrmanian (Saveetha School of Engineering)

Aerodynamic Flow control is one of the exciting avenues in Fluid Dynamics where the incoming flow is manipulated by control mechanism aiming for efficient output characteristics. In this paper, an aircraft wing lift characteristics are improved by employing a vortex generator on the wing's surface and optimizing the position through various geometrical parameters in different conditions. Passive flow control devices achieve the flow separation and delay in the stall by size, shape, position and geometrical characteristics. Vortex generators transfer momentum to the boundary layer, preventing them from detaining flow. In this analysis, a wishbone vortex generator is positioned in an aircraft wing with a cambered NACA662-215 airfoil. The chordwise position, inclination with the base surface and height of the vortex generator are considered for analysis. The geometrical modeling is done using SOLIDWORKS, and Computational analysis is carried out in ANSYS CFX. The optimization parameters are analysed through the Taguchi Optimization technique, and the post-processed results from CFD analysis are validated with wind tunnel experiment. The computational analysis of a clean wing and wing with an optimized vortex generator design is compared with experimental analysis. The validation shows that the vortex generator at 90% chord length and height equivalent to boundary layer thickness at an inclination of 15o

performed better, giving a substantial lift increment of 12.34% with a flow separation gradient of 4.13% achieved in this analysis. The work is expected to extend towards the effect of length, number of pairs and spacing between vortex generators and incorporate in wind turbine blades in the future. This investigation can extend to future unconventional shapes such as ogival and vane generators.

(http://camse.in/)

Tentative Minute to Minute Programme

2nd September 2023			
10:15 – 10:17 AM*	**Welcome of the Guests**		
10:17 – 10:20 AM	About the Conference and STEM Research Society by Prof. (Dr.) Tarun Kumar Sharma, Convener – CAMSE2023		
10:20 – 10:23 AM	Overview of the CAMSE Series by Dr. Om Prakash Verma, Dr. B. R. Ambedkar NIT Jalandhar		
10:23 – 10:30 AM	Address by Dr. G. Manik, General and Program Chair cum Head of Department Polymer and Process Engineering, IIT Roorkee		
10:30 – 10:32 AM	**Release of the Book of Abstract**		
10:32 – 10:40 AM	**Words of wisdom by Chief Guest**		
10:40 – 10:45 AM	Vote of Thanks by Prof. (Dr.) Tarun Kumar Sharma, Convener – CAMSE2022		
11:15 – 12:45 PM	**PLENARY TALK – I** Dr. Lipo Wang School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore Title of the Talk: Machine Learning for Time-Series Data Classification and Prediction		
02:00 – 03:30 PM	**PLENARY TALK – II** Prof. Ram Bilas Pachori Professor, Department of Electrical Engineering, IIT Indore, India Title of the Talk: Multivariate EEG Analysis and Machine Learning for Brain Disease Diagnosis and BCI		
03:30 – 04:30 PM	**Track-1**	**Track-2**	**Track-3**
	CAMSE202310 **CAMSE202326** **CAMSE2023196** **CAMSE2023115** **CAMSE2023189** **CAMSE2023066** **Google meet Link:** **https://meet.google.com/csb-zzsr-psd**	**CAMSE2023251** **CAMSE2023253** **CAMSE2023126** **CAMSE2023250** **CAMSE2023229** **CAMSE2023179** **CAMSE2023189** **Google meet Link:** **https://meet.google.com/noc-oyvn-sjo**	**CAMSE2023177** **CAMSE2023126** **CAMSE2023253** **CAMSE2023181** **CAMSE2023008** **CAMSE2023183** **Google meet Link:** **https://meet.google.com/yiq-aipy-nub**
	Track-4	**Track-5**	**Track-6**
	CAMSE2023333 **CAMSE2023166** **CAMSE2023134** **CAMSE2023184**	**CAMSE20230105** **CAMSE20230106** **CAMSE20230108** **CAMSE20230110**	**CAMSE20230043** **CAMSE20230044** **CAMSE20230083** **CAMSE20230087**

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04:45 – 06:15 PM	**PLENARY TALK – III** Prof. H. M. Pandey Data Science and Artificial Intelligence Department, Bournemouth University, Bournemouth, England, UK Title of the Talk: Deep Learning Model for Automatic Diagnosis of Depression from Facial Image Sequence from Videos		
3rd September			
09:30 – 11:00 AM	**Track-7**	**Track-8**	**Track-9**
	CAMSE20230001 CAMSE20230003 CAMSE20230030 CAMSE20230054 CAMSE20230055 CAMSE20230088 CAMSE20230109 CAMSE20230132	CAMSE20230007 CAMSE20230024 CAMSE20230053 CAMSE20230085 CAMSE20230100 CAMSE20230157 CAMSE20230176 CAMSE20230179	CAMSE20230010 CAMSE20230025 CAMSE20230036 CAMSE20230074 CAMSE20230115 CAMSE20230127 CAMSE20230156 CAMSE20230082
11:15 – 12:45 PM	**PLENARY TALK – VI** Dr. Steven L. Fernandes Creighton University, California Plaza, Omaha, United States		
12:45 PM ONWARDS	**VALEDICTORY & PRIZE DISTRIBUTION**		

**Timings are in IST*

Important Instructions:

- ✓ The links for all Inaugural sessions, Plenary Talk and Valedictory & Prize Distributions https://meet.google.com/hqe-rqfk-yvi
- ✓ All the participants and session chairs are requested to login 15 minutes before the scheduled time.
  (Time for each presentation is 10 minutes including Suggestions)
- ✓ Inauguration, Plenary Talk, Valedictory and Prize Distribution Session will be live on the respective time mentioned above. You all are requested to login 15 minutes before the scheduled time.
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